THE DOMESTIC ENCYCLOPÆDIA;

OR,

A DICTIONARY OF FACTS, AND USEFUL KNOWLEDGE.

COMPREHENDING

A CONCISE VIEW OF THE LATEST DISCOVERIES, INVENTIONS, AND IMPROVEMENTS,

CHIEFLY APPLICABLE TO RURAL AND DOMESTIC ECONOMY.

TOGETHER WITH

DESCRIPTIONS OF THE MOST INTERESTING OBJECTS OF NATURE AND ART; THE HISTORY OF MEN AND ANIMALS, IN A STATE OF HEALTH OR DISEASE; AND PRACTICAL HINTS RESPECTING THE ARTS AND MANUFACTURES, BOTH FAMILIAR AND COMMERCIAL.

ILLUSTRATED WITH NUMEROUS ENGRAVINGS AND CUTS.

IN FIVE VOLUMES.

VOLUME III.

BY A. F. M. WILLICH, M.D.

AUTHOR OF THE LECTURES ON DIET AND REGIMEN, &c. &c.

FIRST AMERICAN EDITION; WITH ADDITIONS, APPLICABLE TO THE PRESENT SITUATION OF THE UNITED STATES:

BY JAMES MEASE, M.D.

AND FELLOW OF THE AMERICAN PHILOSOPHICAL SOCIETY.

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THE

DOMESTIC ENCYCLOPÆDIA.

FIRE, is that subtle, invisible cause, which penetrates both solid and liquid matters with extreme facility, and renders them hot to the touch. It is also the chief agent, by which the composition and decomposition of natural bodies is generally effected; so that, without fire, the animal and vegetable kingdoms would cease to exist.

Various opinions have been maintained concerning the nature and properties of fire; for an account of which, we are obliged to refer the reader to the works of BOYLE, NEWTON, and SCHEELE; as we propose to give a few illustrations connected with this subject, under the article HEAT.

Though designed to be subservient to the most useful purposes, fire frequently becomes a scourge to mankind; and, unless it be timely discovered lays whole streets and towns in ashes. Hence the securing of houses and other buildings against this devouring element has ever formed an important object of inquiry, while it has exercised the ingenuity of intelligent men: we shall briefly state a few of the most remarkable experiments, together with the result or success which has attended them.

D. HALES first proposed a plan of covering the floors of houses with earth. The thicker the mould is laid on the floors, the greater is the security. He supposes that the depth of an inch will be amply sufficient; though he recommends to lay a deeper coat on the stairs; because fire in general, ascends by means of stair-cases with the greatest velocity.

A patent was granted in April, 1773, to DAVID HARTLEY, Esq. of Golden-square, for his method of securing buildings and ships against fire.

Lord MAHON has likewise invented a very simple and effectual mode of securing every kind of building against all danger of fire: he divides it into three parts, namely, *under-flooring*, *extra-lathing*, and *inter-securing*. The first part or method, is either single or double. In *single under-flooring*, a common strong lath, one quarter of an inch thick, should be nailed against each side of every joist and main timber, supporting the floor which is to be secured. Similar laths are then to be nailed on the whole length of the joists, the ends of which abutt against each other. The top of each lath or fillet, ought to be an inch and a half below the top of the joists or timbers, against which they are nailed, so as to form

a small ledge on every side. When these fillets are nailed on, they should be laid in a rough plaster, which ought to be spread on the tops of such fillets, so as to leave no vacant space between them and the joists. Short pieces of common laths are next to be nailed, closely together, in a direction contrary to that of the joists ; the ends of the former are to rest on the fillets, and to be well bedded in rough plaster but not fastened with nails. They are next to be coated once with the plaster, which is to be spread over them to the tops of the joists. In *double-flooring*, the fillets and short pieces of laths are applied in the manner already described ; the coat of rough plaster ought, however, in this method, to be somewhat more than half as thick as that in single-flooring.... While the rough plaster is laying on, some additional short pieces of laths are to be inserted between the joists upon the first coat, as closely to each other as possible, and in the same direction as the first layer of laths. Over this second layer of short laths, another coat of rough plaster should be spread, which ought to be trowelled level with the tops of the joists.

As soon as the plaster-work between the joists is perfectly dry, it should be inspected, in order to ascertain whether there be any small cracks, especially next to the joists. Should any occur, it will be requisite to close them, by washing them over with a brush, wetted with mortar-wash, which may be prepared by mixing two measures of quick-lime and one of sand in a pail, and tempering the whole with water, till it acquires the consistence of a thin jelly.

Previously to laying down the flooring-boards, a small quantity of dry common sand should be strewed over the plaster-work, and struck smooth with a hollow rule in the same direction as the joists are laid, so that it may lie *rounding* between each pair of joists. Particular attention should be paid to the plaster-work and sand, that they be perfectly dry before the boards are laid, lest the latter become infected with the dry-rot. The mode of under-flooring may be successfully applied to a wooden staircase ; but no sand is then to be laid upon the plaster-work. The method of extra-lathing may be practised on ceiling-joists, sloping-roofs, and wooden partitions.

The third method, namely, *inter-securing*, is similar to that of under-flooring ; but no sand is afterwards to be laid over it. Inter-securing is applicable to the same parts of a building as the method of extra-lathing ; but it is seldom necessary to be employed. Lord Mahon made several experiments, which shew the utility of this invention : but we can only refer the inquisitive reader to the 68th volume of the "*Philosophical Transactions of the Royal Society*," for 1778 ; where he will find a satisfactory account of the manner of preparing the mórtar, as well as the result of numerous trials made by the inventor....See also Country-houses and Fire-proof.

The most expeditious way of *extinguishing fire* is a matter of equal importance, as the security of buildings from that destructive agent. Hence various machines, and chemical preparations, have been invented by ingenious men, in order to promote so useful an object; one of the earliest contrivances was a barrel, filled with certain ingredients, first proposed by M. Fuchs, a German physi-

cian, in the year 1784; and which effectually answered the purpose for which it was designed....A similar invention was introduced into this country by a Mr. Zachary Greyl, whose machines were made of wood, and contained only water; they were exhibited before several of the nobility, but did not meet with encouragement. In the year 1761, Dr. Godfrey produced certain vessels which in every respect succeeded. They are supposed to have been an improvement on Mr. Greyl's, were constructed with wood, and filled with a chemical liquor, consisting of water, oil of vitriol, and sal ammoniac. When thrown into rooms or other places that were purposely set on fire, they burst, and by their explosion completely extinguished the flames: it is to be observed, that they were useless after the roof had fallen in. These contrivances, however, are evidently more calculated for ships, than to be employed on land; as they would be of great service for suppressing fires in vessels at sea, and might be considered as necessary a part of their cargo as naval stores, or ammunition.

In the 23d. vol. of "*Annals of Agriculture*," Mr. William Knox, a merchant of Gothenburg, in Sweden, states that he has made a variety of experiments for extinguishing fire by means of such substances as are cheap and easily procured. He divides them into *simple* and *compound* solutions. In the former class, he proposes to add to 75 gallons of water, 9 gallons of the stongest solution of wood-ashes; or 6 gallons of the finest pulverized pot ashes; or 8½ gallons of common salt, well dried, and finely beaten; or 8½ gallons of green vitriol or copperas, thoroughly dried and finely pulverized; or 11¼ gallons of the strongest herring-pickle; or 9 gallons of alum reduced to powder; or 19 gallons of clay, perfectly dried, well beaten, and carefully sifted.

Among the *compound* solutions, Mr. Knox recommends to mix 75 gallons of water with 10 quarts of clay, 10 quarts of vitriol, and 10 quarts of common salt; or a similar quantity of water, with 18 quarts of the strongest solution of wood-ashes and 18 quarts of fine clay reduced to powder; or the same proportion of water, with 15 quarts of red-ochre, or the residuum of aquafortis, and 15 quarts of common salt; or, lastly, to mix 15 quarts of the strongest herring-pickle, and 15 quarts of red-ochre, with 75 gallons of water...All these different solutions, Mr. Knox remarks, are equally efficacious in extinguishing fire; but he prefers the compounds, as being the "surest and most powerful for that purpose."

Another of the various inventions for extinguishing fire by chemical means, deserving of notice, is the composition prepared by M. Von Aken, and which consists of the following ingredients:

	lbs.
Burnt alum	30
Green vitriol in powder .	40
Cinabrese, or red-ochre, pulverized	20
Potter's, or other clay, finely powdered and sifted	200
Water	630

With 40 measures of this liquor an artificial fire, which would have required the labour of twenty men, and 1500 measures of common water, was extinguished under the direction of the inventor, by *three* persons. The price of this com-

pound solution is estimated at one halfpenny per pound.

Water Engines for extinguishing fire. These are either forcing or lifting pumps; and as they are made to move with great velocity, their execution principally depends on the length of their levers, and the force with which they are worked.

Various engines have been contrived, from which we have selected the following, as they are the most ingenious, and at the same time calculated to produce the greatest effects....In the year 1785, the silver medal and twenty guineas were conferred by the "*Society for the Encouragement of Arts*," &c. on Mr. FURST, as a reward for his contrivance to increase the effect of engines in extinguishing fires; of which the following is a short description; From a platform rises an upright pole or mast, of such height as may be judged necessary; a gaft slides upon it in an ascending direction, and along both is conveyed the leather hose from the engine. The branch, or *nose-pipe* of the engine, projects at the extremity of the gaft; towards which an iron frame is fixed, whence two chains are suspended; and from these hang ropes, which serve to give an horizontal direction to the branch; while other ropes, that run through proper pullies, and are thus conveyed down the mast, serve likewise to communicate a vertical motion to it. By these means, the branch or nose-pipe of the engine is conducted into the window of any room where the fire more immediately rages; and the effect of the water discharged is applied in the most efficacious manner to the extinguishing of the flames.

A patent was granted in January 1790, to Mr. JOSEPH BRAMAH, of Piccadilly, and to Mr. THOMAS DICKENSON, of Bedworth Close, in the county of Warwick, for a new improved engine on a rotative principle. The merits of this machine depend on its having two wheels or cylinders of brass, or any other metal; one of which is of a greater, and the other of a smaller diameter, in any proportion required; both are nearly of equal length, but may be increased or decreased, according to the purpose to which the machine is applied. As soon as the larger wheel is fixed, the smaller one is placed within it, and is fastened on an axis, so as to turn in a rotative direction round its centre; the smaller wheel being thus stationed, may be occasionally fixed, and the larger one moved in the same direction round the smaller one: the former of these, however, is preferable in all cases. At each end of the larger wheel there is a *stanch*, to which are screwed two plates, or caps inclosing its ends, and into which the extremities of the smaller wheel are inserted, so as to render the junction *water-tight*: through these caps passes the axis of the inner cylinder, in order to communicate motion from without.... Or the inner wheel may be applied so as to give motion, by its external end or ends, to any other engine or machine connected with it.... These are the component parts of Messrs. BRAMAH and DICKENSON's patent engines; for a more particular account of which, we refer the reader, to the 2d vol. of the *Repertory of Arts and Manufactures*, where he will find a minute account of the machinery, and the effects it is calculated to produce.

A patent was likewise granted in

American Fire Engine.

Fig. 1

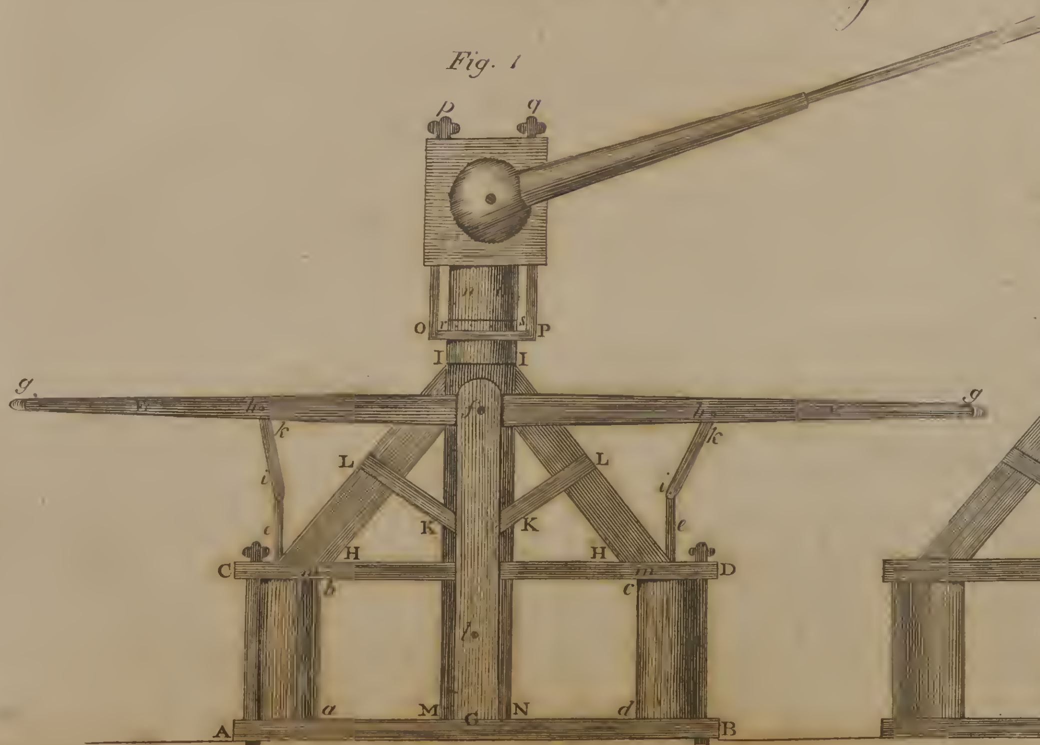
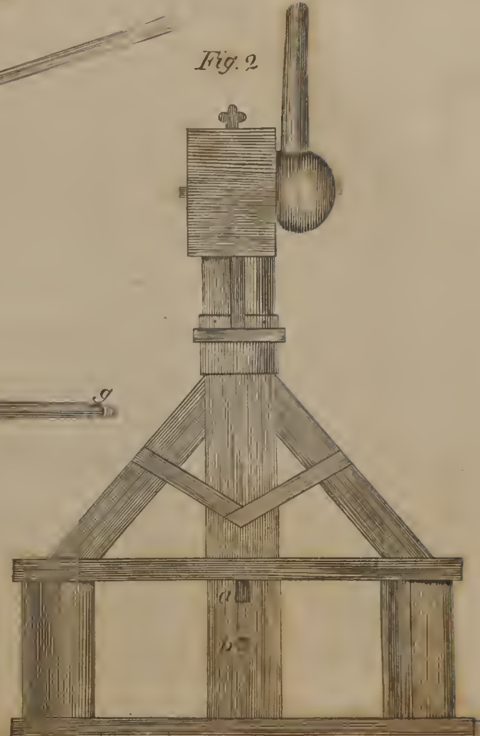


Fig. 2



S. Folwell

December, 1792, to Mr. CHARLES SIMPKIN, of Oxford-street, engine maker, for his improvements in all kinds of machines for extinguishing fire....This invention consists in exploding or removing the valves both from that part of the cylinder, where the vacuum is made by the piston or fly, and from beneath the air vessel; and in making use of valves, by the application of certain filtering chambers, with partitions or divisions, to preserve the effect of the valves, during the use of any improper fluid. These filtering chambers are to be placed between the drawing valves, and the strainer in common use, on the suction-pipe. The partitions in the chambers may be of fine wire-work, or of any other substitute, that will act as a first and second filtration in the chamber.

The design of this invention is, to render the valves more free of access, and to prevent the necessity of opening any other parts of the engine, except the chambers containing the valves; by which means the effect of the machine is increased, and consequently the fire may be more easily extinguished.

To these different contrivances we shall add the American Fire-engine, of which we have given an accurate engraving. It was invented by Mr. BENJAMIN DEARBORN, who communicated it to the *American Academy of Arts and Sciences*, from whose Memoirs for 1794, we extract the following particulars:

Description of the Plate representing the American Fire-engine, on a new construction.

Fig. 1. A B, and C D, are the edges of two planks, confined together by four bolts....*a b*, and *c d*, are two cylindrical barrels, in each of which a piston, with a valve, is fastened to the spear *e*, and is moved up and down alternately by the motion of the arms E E. Beneath each barrel a hole is made through the plank A B, which is covered with a valve. The arms E E, are suspended on the common centre *f*: there are also arms parallel to these on the opposite side; *g g* are the ends of handles which are fastened across the ends of the arms. At *h*, a bolt goes across, from arm to arm, to which the piece *i*, *k*, is affixed, and on which it plays; the lower end of this piece is fastened to the top of the spear *e*....G, *l*, *f*, is a standard for the purpose of supporting the arms, to which there is a correspondent one on the opposite side; both are notched into the edges of the planks, where they are secured by a bolt, which passes through them at *l*, and has a nut or fore-lock on the opposite side. H I, H I, are square braces, answering the purpose of ducts, through which the water ascends from the barrels, passing through the plank at *m*....K L, K L, are irons in the form of a staple, in order to confine the braces: the lower ends of of these irons meet, and are secured by a bolt, passing through them, and M N, *n o*, which is a piece that goes up through a mortice in the centre of the planks. This piece is square from the lower end, till it reaches the top of the braces; whence they become cylindrical to the top, the upper end being perforated sufficiently low down, in order to communicate with the braces. O, P, is an iron ring, that surrounds the tube, and has two shanks which ascend through the head, which screws on the top at *p*, *q* :....*r*, *s*, is a ferule nailed round the tube.

Fig. 2. is the same engine; the arms and standards being taken off, in order to delineate more clearly the mode of securing the braces; an object which is completely effected by a wedge driven into the mortice *a:* beneath the upper plank *b*, is a hole for admitting a passage to the bolt, which secures the standards. In this figure, a side view of the head is given, with the pipe in a perpendicular direction.

The machine is confined within a box, set on wheels, as in the common fire-engines. The whole is made of wood, excepting the spears of the pumps, and a few bolts, &c. The advantages of this machine are, that it can be made in any place where common pumps are manufactured; the interior work will not exceed *one-fourth* of the price of those which are constructed on the usual plan; and that they are incomparably more easy to work than the common ones; circumstances which strongly recommend the American fire-engine to the attention of the public.

FIRE-ARMS, are those which are charged with powder and ball; such as musquets, carbines, pistols, cannons, &c.

In December, 1780, a patent was granted to Mr. John Aitken, of Edinburgh, surgeon, for his invention of a new method of loading fire-arms, of whatever dimensions or forms, with two or more charges of powder and ball, and of discharging them in succession, by fire communicated through correspondent perforations, or touch-holes. This consists in lodging several charges of powder and shot in the fire-arms, whether cylindrical, conical, chambered, or otherwise; the hindmost extremity, or breech, being closed, while the anterior one, or muzzle is open. The extension of the fire, in a posterior direction from the charge next the muzzle that is first inflamed, is intercepted by *intermedia* placed between the several charges, which are firmly rammed about or above the shot; and which are formed of any substance that possesses sufficient resistance, is compact, incombustible, and properly shaped. In the smaller fire-arms, namely, pistols, musquets, blunderbusses, &c. the patentee chiefly employs leather, or other thick stuffs. In the larger ones, such as cannons, mortars &c. he makes use of various pastes, as being more commodious, and more easily procured. The charges are *ignited* through touch-holes, by the lock, or match, as occasion may demand, according to the size and condition of the tube.

A patent was likewise granted to James Wilson, Esq. of St. Martin's in the Fields, for his improvement in the construction of fire-arms, by which the powder will be effectually screened against the influence of the weather, at a less expense than by any other method. His invention consists chiefly in fixing a semi-circular piece of brass or iron, about one line in breadth, over the touch-hole, and which rises upwards with a bevil from the side that joints the barrel. Thus the wet or moisture, which in common fire-arms insinuates itself between the barrel and the hammer or upper pan, where the powder is most exposed, is effectually prevented, and carried off on either side of the arch, or semi-circular piece of metal, by the channel, which is formed by the bevil when in contact with the barrel. This improvement is also applicable to old pans.

[FIRE-BALLS. A very inte-

resting paper on these meteors, by Prof. GMELIN, of Gottingen, may be found in TILLOCH's *Phil. Mag.* vol. iii.

FIRE-BUCKETS. It is a general complaint at the extinguishing of fires, that the water, as it is handed along from the pump to the engine, is continually spilling out of the buckets, to the great annoyance of the persons employed in this service; and what is of more consequence, the great waste of water: so that by the time the bucket arrives at the engine, it is frequently not more than half full.

The form of the buckets, as they are most commonly made, no doubt contributes to this inconvenience: and if they were made of a cylindrical form, or no wider at the mouth than at the bottom, the evil would, in some measure, be remedied, but would still, however, exist in a considerable degree.

The following simple appendage which has been proposed by a correspondent in the *Weekly Mag.* Philadelphia, 1798, to be added to any bucket, at a very trifling expense, will be found an effectual remedy, and without in the least impeding either the filling or the emptying of the bucket: For this purpose, provide a thin circular board of cedar, or other light wood, of the size of the bottom of the bucket inside. This board may be strengthened by tacking on, across the wood one or two small strips or battens. Let a piece of strong twine be made fast to the centre of this board, and also to the centre of the bottom of the bucket, inside; and of such a length as to suffer the board to rise within about an inch of the mouth of the bucket. When the bucket is empty, this board will be on the bottom, and can, therefore, be no obstruction in filling it at the pump; and when filled, it will float on the surface of the water, and in no measure impede its being emptied into the engine, or even discharged by hand against the fire.

The effect of such a float-board, in preventing the evil above stated, will be too easily conceived to need any further explanation.]

FIRE-COCKS, are contrivances for admitting water into pipes or reservoirs: churchwardens in London, and within the bills of mortality, are enjoined to fix them at proper distances in streets, together with painted characters on the opposite wall, pointing out such distance. They are also ordered to deposit in every house thus marked, an instrument or key for opening a plug, and likewise a large engine, and an hand engine, under the penalty of 10*l.*

FIRE-ESCAPE, a contrivance for the purpose of rescuing persons in imminent danger from fire.

In the *Annual Register* for 1775, an account is given of a machine for saving persons and effects from the flames. It consists, 1. Of a pole of fir, which may be of any convenient length, being about 5 inches in diameter at the bottom, and at the top or smaller end, about three inches. At the distance of three feet from the top, is a mortice through the pole, to which a pully is fixed, that is nearly of the same diameter as that part of the pole. 2. A rope about three-fourths of an inch in diameter, and twice the length of the pole, at one end of which is a spring-hook, to pass through the handle of the basket, when used; it is put through the mortice over the pully, and drawn tight on each side, nearly to the bottom of the pole, where it is secured till wanted. 3. A basket, which ought to be of strong wicker-

work, three and a half feet long, two and a half feet wide, rounded off at the corners; and four feet deep, rounding every way at the bottom. To the top of the basket is fixed a strong iron curve, or handle, with an eye or ring in the middle: a small cord about the length of the pole, is likewise fastened to one side of the basket, near the top. These being the principal parts, there are also several straps, &c. for securing the poles from sliding; of which the reader will find a minute account in the volume before quoted. This contrivance can be raised, and two or more persons may be taken out of the upper windows of a house, and let down safely in the street, within the space of *thirty-five seconds*, or in little more than half a minute.

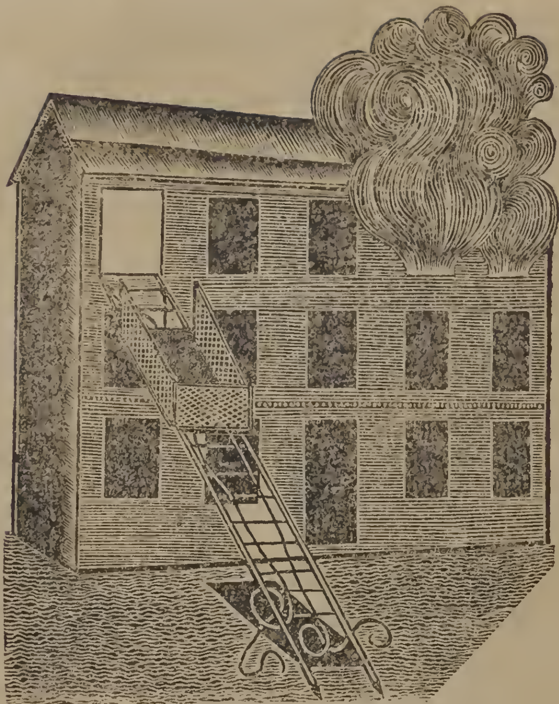
A machine for this purpose has lately been invented by the Rev. Dr. NICHOLAS COLLIN, of Philadelphia, the following description of which we have abridged from the 4th vol. of the *Transactions of the American Philosophical Society*. A strong wooden case is erected near the end of a rectangular stage of solid planks, mounted on four wheels (with locks to secure the latter when the machine is employed), for the reception of an upright round shaft. This shaft is moveable in the case, by means of two ropes fastened to its foot; which, after passing over two pullies or sheaves in the top of the case (one being on each side), are fastened to two windlasses, by winding or unwinding which, the round shaft is raised or lowered. On the top of this upright moveable shaft, is an iron fork with a transverse pin, on which rolls a lever with unequal arms. The longest arm is directed towards the fore-end of the stage, which it ought not to exceed in length, unless the hinder end be proportionably loaded. The shortest arm is lowered or raised by a rope fastened to its extremity, which reaches to the posterior end of the stage, and may be pulled either by men or by a windlass: or, a compound pulley may be substituted for the rope. To the fore-end of the longest arm of the lever, a basket is suspended, by three iron rods, for the reception of persons or goods in danger, and which, by loosening the hinder rope, is thus lowered. As, however, in great elevations, the basket cannot reach the ground, a rope is fastened to it, by which persons or goods may descend.... Dr. COLLIN mentions a larger and a smaller kind of this machine, by the former of which twelve persons may be let down, and by the latter four. As he has not specified any dimensions, we suppose that they are to be proportioned to the height, at which houses and other builings are in general erected, and to the number of persons the machine is intended to rescue. We cannot, on this occasion, omit to point out the great utility of those *fringed ropes* which should be fastened to the foot of a bedstead, and extend to a sufficient length, to descend by them, in case of fire thro' a window: they are sold by several rope manufacturers in town, generally at two shillings per yard.

[The following description of a FIRE-ESCAPE, was drawn up for the editor, by Mr. B. DEARBORN, of Boston, (inventor of the machine) already mentioned under the articles BALANCE, and FIRE ENGINE. The contrivance of Mr. D. is certainly the best, that has ever come

to our knowledge, and ought to be generally adopted. It consists of a ladder, platform, and receiver; the ladder is made with two parallel sides, each of which has two straight and plain surfaces; on the two outsides a groove runs from one end to the other; in these grooves two ledges slide, which being nailed to the bottom of the receiver, keep it from slipping off; the bottom of the receiver is made of boards, somewhat longer than the breadth of the ladder, which are confined together by the ledges; the two sides, and one end of the receiver are guarded with an iron frame and net-work: the receiver is drawn up the ladder by two ropes which pass over pullies near the top of the ladder; the pullies are fixed in separate pieces, which are nailed on the inner surface of each side of the ladder, a little below its upper edge, so that the ropes may pass between the steps of the ladder and the bottom of the receiver; the ropes are made fast under the bottom of the receiver; then passing upward *over* the steps of the ladder, they go over the pullies, and their ends go down *under* the steps of the ladder to the platform; the platform is made of boards, nailed to two long hinges, by which it is attached to the ladder near the bottom; the extremity of each hinge is made sharp, and is turned downward to enter the ground and assist in keeping the ladder steady; the feet of the ladder are also guarded with iron points. The men who draw up and let down the receiver, stand on the platform, whereby they have a clear stage for themselves and the ropes, and their weight keeps the ladder firm. When the receiver is heavily loaded, it will be necessary to pass the ropes under one of the steps of the ladder, that their friction may increase the power of sustaining the weight. When the ladder is to be removed, the platform is to be turned up and buttoned to the under side, and the receiver is to be made fast, a little above the foot of the ladder, by a pin passing through both; then the ropes can be used in taking down the ladder, and in raising it again when necessary, which it may be best to do thus: let the ladder be laid bottom upward on the ground, the receiver being underneath, and the ropes, uppermost; then the weight of one or more persons on the foot of the ladder, will assist in raising it to a greater or less angle, as the receiver may be nearer or further off from its extremity; then with the assistance of the ropes, it may be raised perpendicular, and directed to its situation." The cut in the next page will convey a full idea of the machine.

After all, perhaps, the best fire-escapes, are stone stairs, with good roomy landing places, and a thin wall to support the off ends of the steps, the other ends being built into substantial side walls.]

FIRE-IRONS, are those instruments which are employed in the management of a fire, namely, poker, shovel, and the different kinds of tongs. As the manufacture of these articles is acknowledged to be very unwieldy, Mr. SAMUEL BENTHAM, of Queen-square Place, in Middlesex, obtained a patent in the month of April, 1793, for a new method of making fire-irons. His invention consists in forming those instruments *tubular*; the cylinders being closed at the ends, as well for strength as for keeping out dust; hence they acquire a degree



of lightness, which the patentee affirms cannot be given them by any other means, with the same degree of strength. The joint of the tongs may be made in a manner similar to common ones, or with a spring-joint resembling that of sugar-tongs. The two legs are joined together by a flat, broad, semi-circular plate, hardened so as to acquire a proper degree of elasticity. The ends of the tongs may be either flat, as is usual, or hollow like a spoon. The materials may be either entirely iron, or those parts which are not intended to come in contact with the fire, may be of silver, plated work, or any other metal. With respect to the poker and shovel, the ends may, for the same reason, be in separate pieces from the stems; but as that of the poker is frequently exposed to the fire, it becomes necessary to make it, if tubular, much thicker than the stem. The chief object of this contrivance is simplicity and lightness; but we doubt whether it is calculated for general use.

FIRE-PLACE, a contrivance for communicating heat to rooms, and also for answering various purposes of art and manufacture. With respect to the latter kind, we propose to treat under the articles of FURNACE and STOVE.

In the construction of fire-places for domestic purposes, the chief object is the saving of fuel: with this intention, several ingenious artists have invented different kinds of grates, more or less adapted to that useful end.

The fire-places in general use, are, 1. The large open ones, which were commonly adopted in former

times, and are still retained in the country, and in kitchens: they require a wide funnel, consume a great quantity of fuel, and generally smoke, unless the door, or a window, be left open.

2. The modern fire-places generally adopted in towns, are constructed with low breasts and hearths, narrowed by jambs..... These being more contracted than the antiquated chimnies, easily keep the room free from smoke; but the funnel necessarily occasions a considerable draught of air, which rushing in at every crevice, renders the situation of those who are exposed to it very uncomfortable, and even dangerous: for it is unquestionable, that most of the diseases that proceed from colds, may be justly attributed to the strong draught of chimnies, by which, in severe weather, persons are scorched *before*, while they are freezing *behind*. Such fire-places, therefore, are of little service in heating rooms, as the surrounding air, which is warmed by the direct rays of the fire, does not remain in the apartment, but is continually collected in the chimney, by the current of cold air which surrounds it, and by which it is in a short time carried off. Nor is this the only inconvenience attendant on such improper contrivances, for the greatest part of the fire is lost, in consequence of its being absorbed by the back, jambs, and hearth, which are dark and obscure, and reflect very little, so that the heat flies directly up the chimney.

3. To remedy this inconvenience, an ingenious Frenchman, named GAUGER, in the year 1709, proposed seven different constructions of a new kind of chimnies, in which there are hollow cavities, formed by means of iron plates inserted in the back, jambs, and hearth: through these the heat passes and warms the air in those cavities, which is thus continually communicated to the room. Although many advantages arise from this arrangement, yet the expense necessarily incurred, must ever be an insuperable obstacle to its general adoption.

4. Another kind of fire-place is the *Holland iron-stove*, which has a flue proceeding from the top, and a small iron door that opens into the apartment. They serve to warm a room, lessen the consumption of fuel, and to produce a constant change of air; but, as the fire is too much confined, it is neither sufficiently cheerful, nor calculated for culinary purposes, and is therefore employed chiefly in work-shops.

5. The *German stove* consist of five iron plates, which are screwed closely together in such a manner, that the fuel may be put into it from another room, and even from the outside of the house. This stove warms rooms with little fuel, and is not attended with any danger from the irruption of cold air; but it admits of no change or draught of air in the room, and the fire is likewise concealed.

[Dr. WILLICH recommends the FRANKLIN stoves in preference to the chimnies as constructed upon the plan of Count RUMFORD; but as we have had a full experience of both, in this country, the general decision of Americans in favour of the latter is acceded to by the editor. Besides the common objections made to open stoves, that they give out a heat very unpleasant to the feelings; and that it is regulated with difficulty; another important objection against them has been urged, viz. that when

heated, they *consume the wood.* As an open fire-place, *properly constructed*, so as to burn the wood with no more rapidity than is requisite to carry up the smoke, answers all the purposes of *common* warmth, we have no hesitation in giving a decided preference to Count RUMFORD's improvements. For this reason, an abridged and condensed account of his observations on chimnies, and of his directions for laying out the work shall now be presented: These directions are taken from the COUNT's first and third vol. of essays.

The great fault of all the open fire-places, or chimnies, for burning wood or coals in an open fire, now in common use, is, that they are much too large; or rather it is *the throat of the chimney*, or the lower part of its open canal, in the neighbourhood of the mantle, and immediately over the fire, which is too large. This opening has hitherto been left larger than otherwise it probably would have been made, in order to give a passage to the chimney-sweeper; but I shall shew hereafter, how a passage for the chimney-sweeper may be contrived without leaving the throat of the chimney of such enormous dimensions as to swallow up and devour all the warm air of the room, instead of merely giving passage to the smoke and heated vapour which arise from the fire, for which last purpose alone it ought to be designed.

As the immoderate size of the throats of the chimnies is the great fault of their construction, it is the fault which ought always to be first attended to in every attempt to improve them; for, however perfect the construction of a fire-place may be in other respects, if the opening for the passage of the smoke is larger than is necessary for that purpose, nothing can prevent the warm air of the room from escaping through it; and whenever this happens, there is not only an unnecessary loss of heat, but the warm air which leaves the room to go up the chimney being replaced by cold air from without, the draught of cold air so often mentioned, cannot fail to be produced in the room, to the great annoyance of those who inhabit it. But, although both these evils may be effectually remedied, by reducing the throat of the chimney to a proper size, yet in doing this, several precautions will be necessary. And first of all, the throat of the chimney should be in its proper place; that is to say, in that place in which it ought to be, in order that the ascent of the smoke may be most facilitated; for every means which can be employed for facilitating the ascent of the smoke in the chimney must naturally tend to prevent the chimney from smoking; now as the smoke and hot vapour which rise from the fire naturally tend *upwards*, the proper place for the throat of the chimney is evidently perpendicularly *over the fire*. The nearer the throat of a chimney is to the fire, the stronger will be what is commonly called its *draught*, and the less danger there will be of its smoking. But on the other hand when the draught of a chimney is very strong, and particularly when this strong draught is occasioned by the throat of the chimney being very near the fire, it may so happen that the draught of air into the fire may become so strong, as to cause the fuel to be consumed too rapidly.

In introducing the improvements proposed in chimnies already

built, there can be no question in regard to the height of the throat of a chimney, for its place will be determined by the height of the mantle. It can hardly be made lower than the mantle; and it *ought always to be brought down as nearly upon a level with the bottom of it as possible.* If the chimney is apt to smoke, it will sometimes be necessary either to lower the mantle, or to diminish the height of the opening of the fire-place, by throwing over a flat arch, or putting in a straight piece of stone from one side of it to the other; or, which will be still more simple and easy in practice, building a wall of bricks, supported by a flat bar of iron immediately under the mantle.

Nothing is so effectual to prevent chimnies from smoking, as diminishing the opening of the fire-place in the manner here described, and lowering and diminishing the throat of the chimney; and I have always found, except in a single instance, that a perfect cure may be effected by *these means alone*, even in the most desperate cases. It is true, that when the construction of the chimney is very bad indeed, or its situation very unfavourable to the ascent of the smoke, and especially when both these disadvantages exist at the same time, it may sometimes be necessary to diminish the opening of the fire-place, and particularly to lower it, and also to lower the throat of the chimney more than might be wished.

The position of the throat of a chimney being determined, the next points to be ascertained are its size and form, and the manner in which it ought to be connected with the fire-place below, and with the open canal of the chimney above.

That these inquiries may be pursued with due method, and that the conclusions drawn from them may be clear and satisfactory, it will be necessary to consider; first, what the objects are, which ought principally to be had in view in the construction of a fire-place; and secondly, to see how these objects can best be attained.

Now the design of a chimney fire being simply to warm a room, it is necessary first of all, to contrive matters so, that the room shall be actually warmed; secondly, that it be warmed with the smallest expense of fuel possible; and, thirdly, that in warming it, the air of the room be preserved perfectly pure, and fit for respiration, and free from smoke and all disagreeable smells.

When fuel is burnt in fire-places upon this simple construction, when the smoke escapes immediately by the open canal of the chimney, it is quite evident, that all the combined heat must of necessity be lost; and as it is the radient heat alone which can be employed in heating a room, it becomes an object of much importance to determine how the greatest quantity of it may be generated in the combustion of the fuel, and how the greatest proportion of that generated may be brought into the room.

Now the quantity of radient heat generated in the combustion of a given quantity of any kind of fuel depends very much upon the management of the fire, or upon the manner in which the fuel is consumed. When the fire burns bright, much radient heat will be sent off from it; but when it is *smothered up*, very little will be generated; and indeed very little combined heat, that can be employed to any useful purpose: most of

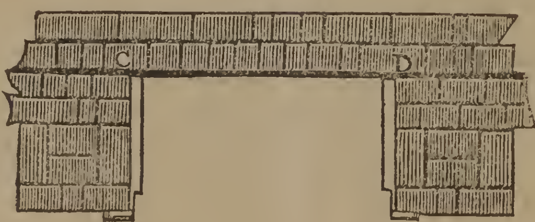
the heat produced will be immediately *expended* in giving elasticity to a thick dense vapour or smoke, which will be seen rising from the fire; and the combustion being very incomplete, a great part of the inflammable matter of the fuel being merely rarified and driven up the chimney without being inflamed, the fuel will be wasted to little purpose. And hence it appears of how much importance it is, whether it be considered with a view to economy, or to cleanliness, comfort and elegance, to pay due attention to the management of a chimney-fire.

So many coals should never be put on the fire at once as to prevent the free passage of the flame between them. In short, a fire should never be smothered; and when proper attention is paid to the quantity of coals put on, there will be very little use for the poker; and this circumstance will contribute very much to cleanliness, and to the preservation of furniture.

For bringing as much radiant heat as possible into the room, we must cause as many as possible of the rays, as they are sent off from the fire in straight lines, to come *directly* into the room; which can only be effected by bringing the fire as far forward as possible, and leaving the opening of the fire-place as wide and as high as can be done without inconvenience; and secondly, by making the sides and back of the fire-place of such form, and constructing them of such materials, as to cause the direct rays from the fire, which strike against them, to be sent into the room *by reflection* in the greatest abundance.

Now it will be found upon examination, that the best form for the vertical sides of a fire-place, or the *covings*, (as they are called), is that of an upright plane, making an angle with the plane of the back of the fire-place of about 135 degrees. According to the present construction of chimnies, this angle is 90 degrees, or forms a right-angle; but as in this case the two sides or covings of the fire-place, (A C, B D, Fig. 1.) are parallel to each other, it is evident that they are very badly contrived for throwing into the room, by reflection, the rays from the fire which fall on them.

Fig. 1.



In regard to the materials which it will be most advantageous to employ in the construction of fire-places, I flatter myself, that no great difficulty will attend the determination of that point. As the object in view is, to bring radient heat into the room, it is clear, that that material is best for the construction of a fire-place which reflects the most, or which *absorbs the least* of it; for that heat which

is *absorbed* cannot be *reflected*..... Now, as bodies which absorb radiant heat, are necessarily heated in consequence of that absorption, to discover which of the various materials that can be employed for constructing fire-places are best adapted for that purpose, we have only to find out by an experiment, very easy to be made, what bodies acquire *least heat* when exposed to the direct rays of a clear fire ; for those which are least heated, evidently absorb the least, and consequently reflect the most radiant heat. And hence it appears that iron, and, in general, metals of all kinds, which are well known to *grow very hot* when exposed to the rays projected by burning fuel, are to be reckoned amongst the *very worst* materials that it is possible to employ in the construction of fire-places.

[The impropriety of the fashionable iron jambs, is rendered evident from this just theory.]

The best materials I have hitherto been able to discover, are fire stone, and common bricks and mortar. Both these materials are, fortunately, very cheap ; and as to their comparative merits, I hardly know to which of them the preference ought to be given.

When bricks are used, they should be covered with a thin coating of plaster, which, when it is become perfectly dry, should be white-washed. The fire-stone should likewise be white-washed, when that is used ; and every part of the fire-place which is not exposed to being soiled and made black by the smoke, should be kept as white and clean as possible. As *white* reflects more heat, as well as more light, than any other colour, it ought always to be preferred for the inside of a chimney-fire-place, and *black*, which reflects neither light nor heat, should be most avoided.

Register-stoves have often been found to be of use, but it is because the great fault of all fire-places constructed upon the common principles, being the enormous dimensions of the throat of the chimney, this fault has been in some measure corrected by them ; but I will venture to affirm, that there never was a fire-place so corrected, that would not have been much more improved, and with infinitely less expense, by the alterations here recommended, and which shall be now more particularly explained.

Practical directions designed for the use of workmen; shewing how they are to proceed in making the alterations necessary to improve chimney-fire-places, and effectually to cure smoking chimnies.

By the *throat* of a chimney, I mean the lower extremity of its canal, where it unites with the upper part of its open fire-place....... This throat is commonly found about a foot above the level of the lower part of the mantle, and it is sometimes contracted to a smaller size than the rest of the canal of the chimney, and sometimes not.

The *breast* of a chimney is that part of it which is immediately behind the mantle. It is the wall which forms the entrance from below into the throat of the chimney in front, or towards the room. It is opposite to the upper extremity of the back of the open fire-place, and parallel to it ; in short, it may be said to be the back part of the mantle itself.

The *width* of the throat of the chimney is taken from the breast of the chimney to the back, and its *length* is taken at right-angles

to its width, or in a line parallel to the mantle.

Before I proceed to give particular directions respecting the exact forms and dimensions of the different parts of a fire-place, it may be useful to make such general and practical observations upon the subject, as can be clearly understood, without the assistance of drawings; for the more complete the knowledge of any subject is which can be acquired without drawings, the more easy will it be to understand the drawings, when it becomes necessary to have recourse to them.

The bringing forward of the fire into the room, or rather bringing it nearer to the front of the opening of the fire-place;....and the diminishing of the throat of the chimney, being two objects principally had in view in the alterations of fire-places here recommended, it is evident that both these may be attained merely by bringing forward the back of the chimney. The only question, therefore, is, how far it should be brought forward? The answer is short and easy to be understood; bring it forward as far as possible without diminishing too much the passage which must be left for the smoke. Now as this passage, which, in its narrowest part, I have called *the throat of the chimney*, ought, for reasons which have been fully explained, to be immediately, or perpendicularly over the fire, it is evident that the back of the chimney must always be built perfectly upright. To determine, therefore, the place for the new back, or how far precisely it ought to be brought forward, nothing more is necessary than to ascertain how wide the throat of the chimney ought to be left, between the top of the breast of the chimney, where the upright canal of the chimney begins, and the new back of the fire-place carried up perpendicularly to that height.

In the course of my numerous experiments upon chimnies, I have taken much pains to determine the width proper to be given to this passage, and I have found, that, when the back of a fire-place is of a proper width, the best width for the throat of the chimney, when the chimney and the fire-place are at the usual form and size, is *four inches*....Three inches might sometimes answer, especially when the fire-place is very small, and the chimney good and well situated: but as it is always of much importance to prevent those accidental puffs of smoking which are sometimes thrown into rooms by the carelessness of servants in putting on suddenly too many coals at once upon the fire; and as I found these accidents sometimes happened, when the throats of chimnies were made very narrow, I found that, upon the whole, all circumstances being well considered, and advantages and disadvantages compared and balanced, four inches is the best width that can be given to the throat of a chimney; and this, whether the fire-place be destined to burn wood, coals, turf, or any other fuel commonly used for heating rooms by an open fire.

And this leads us to consider another important point respecting open fire-places, and that is, the width which it will, in each case, be proper to give to the back. In fire-places as they are now commonly constructed, the back is of equal width with the opening of the fire-place in front; but this construction is faulty on two accounts.

First, in a fire-place so construct-

ed, the sides of the fire-place, or *covings*, as they are called, are parellel to each other, and consequently ill contrived to throw out into the room the heat they receive from the fire in the form of rays; and secondly, the large open corners which are formed by making the back as wide as the opening in front of the fire-place, occasion eddies of wind, which frequently disturb the fire and embarrass the smoke in its ascent, in such a manner as often to bring it into the room. Both these defects may be entirely remedied, by diminishing the width of the back of the fire-place....The width, which, in most cases, it will be best to give it, is *one-third* of the width of the opening of the fire place in front....But it is not absolutely necessary to conform rigorously to this decision, nor will it always be possible....It will frequently happen, that the back of a chimney must be made wider, than, according to the rule here given, it ought to be.....This may be, either to accommodate the fire-place to a stove, which being already on hand, must, to avoid the purchasing of a new one, be employed; or for other reasons.... and any small deviation from the general rule will be attended with no considerable inconvenience...... It will always be best, however, to conform to it as far as circumstances will allow.

Where a chimney is designed for warming a room of a middle size, and where the thickness of the wall of the chimney in front, measured from the front of the mantle to the breast of the chimney, is 9 inches, I should set off four inches more for the width of the throat of the chimney, which, supposing the back of the chimney to be built upright, as it always ought to be, will give thirteen inches for the depth of the fire-place, measured upon the hearth, from the opening of the fire-place in front, to the back. In this case, thirteen inches would be a good size for the width of the back; and three times thirteen inches, or thirty-nine inches, for the width of the opening of the fire-place in front; and the angle made by the back of the fire-place and the sides of it, or covings, would be just 135 degrees, which is the best position they can have for throwing heat into the room.

But I will suppose, that in altering such a chimney it is found necessary, in order to accommodate the fire-place to a grate or stove already on hand, to make the fire-place sixteen inches wide. In that case, I should merely increase the width of the back, to the dimensions required, without altering the depth of the chimney, or increasing the opening of the chimney in front. The covings, it is true, would be somewhat reduced in their width, by this alteration; and their positions with respect to the plane of the back of the chimney would be a little changed; but these alterations would produce no bad effects of any considerable consequence, and would be much less likely to injure the fire-place, than an attempt to bring the proportions of its parts nearer to the standard, by increasing the depth of the chimney, and the width of its opening in front; or than an attempt to preserve that particular obliquity of the covings, which is recommended as the best, (135 degrees), by increasing the width of the opening of the fire-place, without increasing its depth.

In order to illustrate this subject

more fully, we will suppose one case more....We will suppose that in the chimney which is to be altered, the width of the fire-place in front is either wider or narrower than it ought to be, in order that the different parts of the fire-place, after it is altered, may be of the proper dimensions. In this case, I should determine the depth of the fire-place and the width of the back of it, without any regard to the width of the opening of the fire-place in front; when this is done if the opening of the fire-place should be only two or three inches too wide, that is to say, only two or three inches wider than is necessary, in order that the covings may be brought into their proper position with respect to the back, I should not alter the width of the opening, but should accommodate the covings to this width, by increasing their breadth, and increasing the angle they make with the back of the fire-place.....but if the opening of the fire-place should be more than three inches too wide, I should reduce it to its proper width by slips of stone, or by bricks and mortar.

When the width of the opening of the fire-place, in front, is very great, compared with the depth of the fire-place, and with the width of the back, the covings in that case being very wide, and consequently very oblique, and the fire-place very shallow, any sudden motion of the air in front of the fire-place, (that motion, for instance, which would be occasioned by the clothes of a woman passing hastily before the fire, and very near it), would be apt to cause eddies in the air, within the opening of the fire-place, by which puffs of smoke might easily be brought into the room.

Should the opening of the chimney be too narrow, which, however, will very seldom be found to be the case, it will in general be advisable to let it remain as it is, and to accommodate the covings to it, rather than to attempt to increase its width, which would be attended with a good deal of trouble, and probably a considerable expense.

But it is time that I should mention another matter........Provision must be made for the passage of the chimney-sweeper up the chimney.....This may easily be done in the following manner. In building up the new back of the fire-place; when this wall, (which need never be more than the width of a single brick in thickness), is brought up so high, that there remains no more than about ten or eleven inches between what is then the tops of it, and the inside of the mantle, or lower extremity of the breast of the chimney, an opening, or door way, eleven or twelve inches wide, must be begun in the middle of the back, and continue quite to the top of it, which, according to the height to which it will commonly be necessary to carry up the back, will make the opening about twelve or fourteen inches high; which will be quite sufficient to allow the chimney-sweeper to pass. When the fire-place is finished, this door-way is to be closed by a few bricks, by a tile, or a fit piece of stone, placed in it, dry, or without mortar, and confined in its place by means of a rabbit made for that purpose in the brick-work. As often as the chimney is swept, the chimney-sweeper takes down this temporary wall, which is very easily done; and when he has finished his work, he puts

it again into its place....The cut No. 2. will give a clear idea of this contrivance; and the experience I have had of it has proved, that it answers perfectly well the purpose for which it is designed.

I observed above, that the new back, which it will always be found necessary to build, in order to bring the fire sufficiently forward, in altering a chimney constructed upon the common principles, need never be thicker than the width of a common brick.....I may say the same of the thickness necessary to be given to the new sides, or covings, of the chimney; or if the new back and covings are constructed of stone, one inch and three quarters, or two inches in thickness will be sufficient...Care should be taken in building these new walls to unite the back to the covings in a solid manner,

Whether the new back and covings are constructed of stone, or built of bricks, the space between them, and the old back and covings of the chimney ought to be filled up, to give greater solidity to the structure...This may be done with loose rubbish, or pieces of broken bricks or stones, provided the work be strengthened by a few layers or courses of bricks, laid in mortar, [charcoal in powder, mixed with ashes, both of which are bad conductors of heat, were used by the Editor;] but it will be indispensibly necessary to finish the work, where these new walls end, that is to say, at the top of the throat of the chimney, where it ends as rapidly in the open canal of the chimney, by a horizontal course of bricks, *well secured with mortar*...This course of bricks will be upon a level with the top of the door-way left for the chimney-sweeper.

From these descriptions, it is clear, that where the throat of the chimney has an end, that is to say, where it enters into the lower part of the open canal of the chimney, *there* the three walls which form the two covings and the back of the fire-place all end abruptly...It is of much importance, that they should end in this manner; for, were they to be sloped outward, and raised in such a manner as to swell out the upper extremity of the throat of the chimney in the form of a trumpet, and increased by degrees to the size of the canal of the chimney, this manner of uniting the lower extremity of the canal of the chimney with the throat, would tend to assist the winds which may attempt to blow down the chimney, in forcing their way through the throat, and throwing the smoke backward into the room; but when the throat of the chimney ends abruptly, and the ends of the new walls form a flat horizontal surface, it will be much more difficult for any wind from above to find and force its way through the narrow passage of the throat of the chimney.

For the same reason that is to say, to prevent eddies, and to permit the current of air, which passes under the mantle into the chimney, to bend its course upwards, and unite quietly with the ascending current of smoke; the breast of the chimney, which forms that side of the throat that is in front, or nearest to the room, should be neatly cleaned off, and its surface made quite regular and smooth. This is of great consequence, and may be easily done, by covering it with a coat of plaster, which may be made thicker or thinner in different parts as may be necessary

in order to bring the breast of the chimney to be of the proper form.

I have hitherto given no precise directions in regard to the height to which the new back and covings ought to be carried: this will depend, not only on the height of the mantle, but also, and more especially, on the height of the breast of the chimney, when the breast ends, and the upright canal begins. The back and covings must rise a few inches, five or six, for instance, higher than this part.

I mentioned above, that the space between the walls which form the new back and covings, and the old back and sides of the fire-place, should be filled up; but this must not be understood to apply to the wall of dry bricks; or the tile which closes the passage for the chimney sweeper, and the old back of the chimney; for that space must be left void, otherwise, though this tile (which at most will not be more than two inches in thickness) were taken away, there would not be room sufficient for him to pass.

In forming this door-way, the best method of proceeding is, to place the tile, or flat piece of stone destined for closing it, in its proper-place, and to build round it, or rather by the sides of it; taking care not to bring any mortar near it, in order that it may be easily removed when the door-way is finished. With regard to the rabbit which should be made in the door-way to receive it and fix it more firmly in its place; this may either be formed at the same time, when the door-way is built, or it may be made after it is finished, by attaching to its bottom and sides, with strong mortar, pieces of thin roof-tiles: such as are about half an inch in thickness, will be best for this use; if they are thicker, they will diminish too much the opening of the door-way, and likewise, be more liable to be torn away by the chimney sweeper, in passing up and down the chimney.

In placing a grate, the thing principally to be attended to, is, to make the back of it coincide with the back of the fire-place; but, as many of the grates now in common use, will be found to be too large, when the fire-places are altered and improved, it will be necessary to diminish their capacities, by filling them up at the back and sides with pieces of fire-stones: when this is done, it is the front of the flat piece of fire-stone, which is to form a new back to the grate, which must be made to coincide with, and make part of the back, of the fire-place. But in diminishing the capacities of grates with pieces of fire-stone, care must be taken, not to make them *too narrow*.

It frequently happens, that the iron backs of grates, are not vertical, or upright, but inclined backwards. When these grates are so much too wide, as to render it necessary to fill them up behind with fire-stone, the inclination of the back will be of little consequence; for, by making the piece of stone with which the width of the grate is to be diminished, in the form of a wedge or thicker above than below, the front of this stone, which in fact, will become the back of the grate, may be made perfectly vertical; and the iron back of the grate being hid in the solid work of the back of the fire-place, will produce no effect whatever; but if the grate be already so narrow, as not to admit of any diminution of its width, in that case, it will be best to take away the iron-back of

the grate entirely, and fixing the grate firmly in the brick work, cause the back of the fire-place to serve as a back to the grate. This I have very frequently done, and have always found it to answer perfectly well.

Where it is necessary, that the fire in a grate should be very small, it will be best in reducing the grate with fire-stone, to bring its cavity destined for containing the fuel, to the form of one half of a hollow hemisphere; the two semi-circular openings, being one above to receive the coals, and the other in front, or towards the bars of the grate; for when the coals are burnt in such a confined space, and surrounded on all sides, except in the front, and above, by fire-stone, (a substance peculiarly well adapted for confining heat), the heat of the fire will be concentrated, and the cold air of the atmosphere being kept at a distance, a much smaller quantity of coal will burn, than could possibly be made to burn in a grate, where they would be more exposed to be cooled by the surrounding air, or to have their heat carried off by being in contact with iron, or with any other substance, through which heat passes with greater facility, than through fire-stone.

Where grates, which are designed for rooms of a middling size, are larger than 14 or 15 inches, it will always be best, not merely to diminish their lengths, by filling them up at their two ends with fire-stone, but, forming the back of the chimney of a proper width, without paying any regard to the length of the grate, to carry the covings through the two ends of the grate in such a manner, as to conceal them, or at least, to conceal the back corners of them, in the walls of the coving.

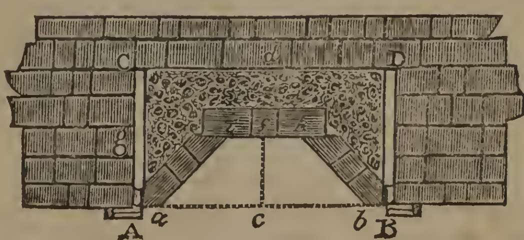
Directions for laying out the work.

If there be a grate in the chimney which is to be altered, it will always be best to take it away; and when this is done, the rubbish must be removed, and the hearth swept perfectly clean.

Suppose figure 2, to represent the ground plan of such a fire-place; A, B, being the opening of it in front, A, C, and B, D, the two sides, or covings, and C, D, the back.

First, draw a straight line, with chalk, or with a lead pencil, upon the hearth, from one jamb to the other, even with the front of the jambs. The dotted line, *a*, *b*, may represent this line.

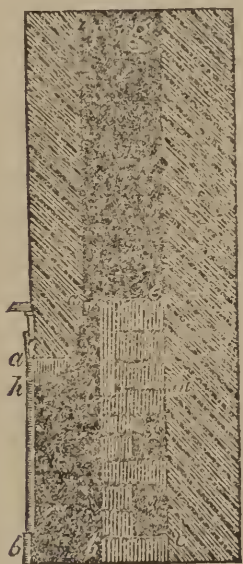
Fig. 2.



From the middle *c*, of this line, (*a*, *b*), another line, *c*, *d*, is to be drawn perpendicular to it, across the hearth, to the middle *d*, of the back of the chimney.

A person must now stand upright in the chimney, with his back to the back of the chimney, and hold a plumb-lime, *exactly to the middle of the upper part of the breast of the chimney*, (*d*, Fig. 3),

Fig. 3.



or, *where the canal of the chimney begins to rise perpendicularly*; taking care to place the line above, in such a manner, that the plumb may fall on the line *c*, *d*, Fig. 1, drawn on the hearth from the middle of the opening of the chimney in the front, to the middle of the back, and an assistant must mark the precise place *e*, on that line where the plumb falls.

This being done, and the person in the chimney having quitted his station, four inches are to be set off on the line *c*, *d*, from *e*, towards *d*; and the point *f*, where these four inches end, (which must be marked with chalk, or with a pencil), will shew, how far the new back is to be brought forward.

Through *f*, draw the line *g*, *h*, parallel to the line A, B, and this line *g*, *h*, will shew the direction of the new back, or the ground line upon which it is to be built.

The line *c*, *f*, will shew the depth of the new fire-place; and if it should happen, that *c*, *f*, is equal to about *one third* of the line A, B; and if the grate can be accommodated to the fire-place, instead of its being necessary to accommodate the fire-place to the grate; in that case, half the length of the line *c*, *f*, is to be set off from *f*, on the line *g*, *f*, *h*, on one side, to *k*, and on the other to *i*; and the line *i*, *k*, will shew the ground line of the fore part of the back of the chimney.

In all cases, where the width of the opening of the fire-place in front; (A, B), happens to be not greater, or not more than two or three inches greater, than *three times* the width of the new back of the chimney (*i*, *k*), this opening may be left, and the lines drawn from *i*, to A, and from *k*, to B. will shew the width and position of the front of the new covings; but when the opening of the fire-place in front, is still wider, it must be reduced, which is to be done in the following manner:

From *c*, the middle of the line A, B, *c*, *a*, and *c*, *b*, must be set off equal to the width of the back

(i, k), added to half its width, (f, i), and lines drawn from i, to a, and from k, to b, will shew the ground-plan of the front of the new covings.

When this is done, nothing more will be necessary, than to build up the back and covings; and if the fire-place is designed for burning coals, to fix the grate in its proper place, according to the directions already given. When the width of the fire-place is reduced, the edgings of the covings a, A, and b, B, are to make a finish with the front of the jambs. And, in general, it will be best, not only for the sake of the appearance of the chimney, but for other reasons, also, to lower the height of the opening of the fire-place, whenever its width in front is diminished.

Whether a chimney be designed for burning wood upon the hearth, or wood, or coals in a grate, the form of the fire-place is, in my opinion, most perfect, when the *width of the back*, is equal to the *depth of the fire-place*, and the opening of the fire-place in front, equal to *three times* the width of the back, or, which is the same thing, to *three times the depth of the fire-place*.

But if the chimney be designed for burning wood upon the hearth, upon And-irons, or dogs, as they are called, it will sometimes be necessary to accommodate the width of the back to the length of the wood, and when this is the case, the covings must be accommodated to the width of the back, and the opening of the chimney in front.

When the wall of the chimney in front, measured from the upper part of the breast of the chimney, to the front of the mantle, is very thin; it may happen, and especially in chimnies designed for burning wood upon the hearth, or upon dogs, that the depth of the chimney, determining according to the directions here given, may be too small.

Thus, for example, supposing the wall of the chimney, in front, from the upper part of the breast of the chimney, to the front of the mantle, to be only four inches, (which is sometimes the case, particularly in rooms situated near the top of a house); in this case, if we take four inches for the width of the throat, this will give eight inches only for the depth of the fire-place, which would be too little, even were coals to be burnt instead of wood. In this case, I should increase the depth of the fire-place at the hearth, to 12 or 13 inches, and should build the back perpendicular to the height of the top of the burning fuel, (whether it be wood burnt upon the hearth, or coals in a grate), and then sloping the back by a gentle inclination forwards, bring it to its proper place, that is to say, *perpendicularly under the back part of the throat of the chimney*. This slope, (which will bring the back forward four or five inches, or just as much as the depth of the fire-place is increased), though it ought not to be too abrupt, yet it ought to be quite finished at the height of eight or ten inches above the fire, otherwise, it may cause the chimney to smoke; but when it is very near the fire, the heat of the fire will enable the current of rising smoke to overcome the obstacle which this slope will oppose to its ascent, which it could not do so easily, were the slope situated at a greater distance from the burning fuel.

Fig. 4.

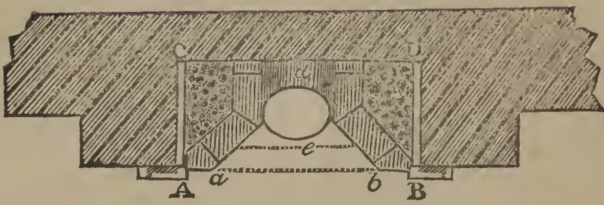


Fig. 4, represents the ground-plan of a chimney fire-place, in which the grate is placed in a niche, and in which, the original width A, B, of the fire-place is considerably diminished.

a, *b*, is the opening of the fire-place in front, after it has been altered, and *d*, is the back of the niche, in which the grate is placed.

Fig 5.

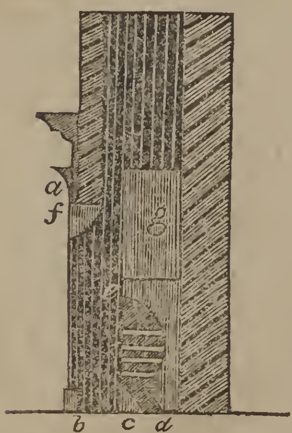
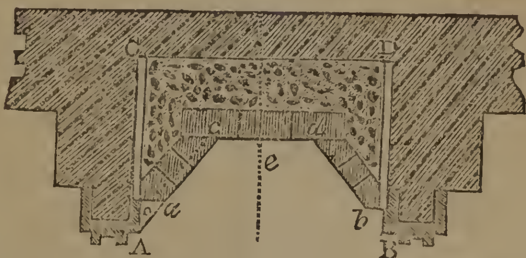


Fig. 5, shews a section of the same fire-place, *c*, *d*, *e*, being a section of the niche, *g*, the door-way for the chimney sweeper, closed by a piece of fire-stone, and *f*, the new wall under the mantle, by which the height of the opening of the fire-place in front, is diminished. The wall of the chimney in front, at *a*, is only four inches thick, four inches more added to it, for the width of throat would have left the depth of the fire-place measured upon the hearth *b*, *c*, only eight inches, which would have been too little ; a niche *c*, and *e*, was therefore made in the new back of the fire-place, for receiving the grate, which niche was six inches deep in the centre of it; below 13 inches, (or equal in width to the grate), and 23 inches high ; finishing above, with a semi-circular arch, which, in its highest part, rose seven inches above the upper part of the grate. The door-way for the chimney sweeper, which begins just above the top of the niche, may be seen distinctly in Fig. 5. The space marked *g*, behind this door-way, may either be filled with loose bricks, or may be left void. The manner in which the piece of stone *f*, which is put under the mantle of the chimney to reduce the height of the opening of the fire-place, is rounded off on the inside, in order to give

a fair run to the column of smoke in its ascent through the throat of the chimney, is clearly expressed in this figure.

I have added the drawing, Fig. 6 merely to shew how a fault very commonly committed is to be avoided. In chimnies like that represented in this figure, where the jambs A and B, project far into the room, and where the front edge of the marble slab *o*, which forms the covings does not come so far forward, as the front of the jambs: the workmen in constructing the new covings are very apt to place them, not in the line *c* A, which they ought to do, but in the line *c o*, which is a great fault. The covings should never range *behind* the front of the jambs, however those jambs may project into the room; but it is not necessary that the covings should make a *finish* with the internal front corners of the jambs, or, that they should be continued from the back *c*, quite to the front of the jambs A. They may finish in the front at *a*, and *b*, and small corners, A, *o*, *a*, may be left, for placing the shovel and tongs.

Fig. 6.



If the under surface of the mantle is flat and wide, it will be impossible to round off the breast properly; and that circumstance renders it necessary in those cases to alter the mantle at *c*, by running under it a thinner piece of stone, or a thin wall of bricks, supported on an iron bar, or a piece of stone, in order that the breast of the chimney may be brought to be of the proper form, and the throat of the chimney may be brought into its proper situation....See Fig. 7.

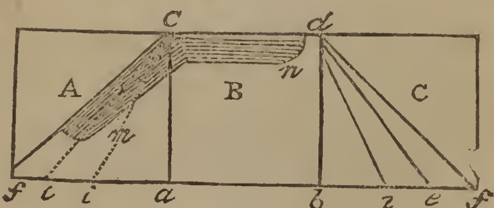
d, shews the top of the breast of the chimney, to be brought down, by means of a wall *h*, placed under the mantle, and a coating of plaster, which is represented by the part marked by dots.

Fig. 7.

To set off an angle of any certain number of degrees.

Upon a board about 18 inches wide, and 4 feet long, or, upon the floor or a table, draw three equal squares, A, B, C, Fig. 8, of about 12 or 14 inches each-side, placed in a straight line and touching each other. From the back corner of the centre square B, draw a diagonal line across the square A, to its outward front corner *f*, and the adjoining angle, formed by the lines *d c*, and *c f*, will be equal to 135 degrees; the angle which the plane of the back of the chimney fire-place ought to make with the plane of its covings. And a bevel *m n*, being made to this angle, with thin slips of hard wood: this little instrument will be found to be very useful in marking out on the hearth, with chalk, the plan of the walls which are to form the covings of fire places.

Fig. 8.



When doors or windows are fitted to their frames with so much nicety, as not to give a sufficient passage to air from without, to get into the room to supply the current up the chimney, which must always exist when a fire is burning in the room, Count RUMFORD mentions the following remedy:

"In building a house, an air canal, about 12 or 15 inches square, in the clear, and open at both ends, may be constructed in, or near the centre of each stack of chimnies, and two branches from this air canal, both furnished with registers, may open into each of the adjoining rooms; one of these branches opening into the fire-place, just under the grate, and the other over the fire-place, and near the top of the room, or just under the ceiling....Each of these branches should be about four inches square, in the clear; and, to prevent the uncouth appearance of the open mouth of that which opens into the room over the fire-place, it may be masked by a medallion, a picture, or any other piece of ornamental furniture proper for that use, placed before it, at the distance of one or two inches from the side or wall of the room.

The bottom of this air tube should reach the ground, where it should communicate with the open air of the atmosphere, but it should not rise quit so high as the chimney, (or canals for conveying off the smoke) are carried up, but should

end, (by lateral openings communicating with the air of the atmosphere) immediately above the roof of the house.

If this air tube be situated in the middle of a building, a horizontal canal, or tube, must be carried from its lower orifice to some open place without the building, in order to establish a free circulation of fresh air, both upwards and downwards, into the air tube."

If brick be used, the best kind to build a fire-place with, are *fire-brick*, which are made of the clay on the banks of the Delaware, below Bordenton, and the isinglass sand found near GRAY's ferry, on Schuylkill. The common soap-stone of the United States is used for fire-stone, with great advantage. But care must be taken in cutting the stone for the jambs, to cut the edge of the block, and to expose it to the fire: if the sides of the stone are next to the fire, it will peel off in large flakes. The advantage of the edge exposure, is not generally known, though of great importance. The soap-stone jambs are much preferable to bricks, as they furnish an uniform surface, and when properly cut, do not break like the bricks. Great quantities of soap-stone are found on the river Schuylkill.

Mr. C. W. PEALE and son RAPHAEL, have described in the 5th vol. of *Amer. Phil. Trans.* certain improvements in fire-places, which consist, 1. Of a sliding mantle of iron or copper, balanced by weights moving behind the frame, composing the frontice-piece of the chimney; 2. A valve of sheet-iron, placed about 12 inches above the opening of the fire-place, in the throat of the chimney, and fitted to shut close on the top of the brick-work, which should be left flat.

The conveniences of this fire-place, are, 1. That the fire may be kindled quickly, and after it burns freely, the valve and damper being lowered, leaving an opening of one or two inches, to carry up the smoke; the fire burns slowly, and but little heat will escape up the chimney.

2. *Safety from fire*....The valve being closely shut, and the sliding mantle lowered to join the hearth, the fire will be smothered. Mr. PEALE, sen. has a chimney altered agreeable to his plan, at the museum, which may be seen at any time. The above improvements, are secured by patent.

In the second vol. of the *Trans. Amer. Phil. Soc.* may be seen a paper, by Dr. FRANKLIN, containing some excellent observations on fire-places and chimnies.

The editor has been minute upon the subject of fire-places, because we have much to learn upon it in the United States; and because he believes with the immortal FRANKLIN, that "more of the prosperity of a winter country depends on the plenty and cheapness of fuel, than is generally imagined," and that the comfort and economy of our citizens will greatly be promoted by an attention to the directions given.

Under the article KITCHEN, shall be given a full account of the admirable economical plans and machines of Count RUMFORD.]

FIRE-PROOF, a term which expresses the effect of certain applications to combustible substances, especially in buildings, with a view to prevent them from being

reduced to ashes. This important object may also be attained by means of erecting whole houses with a mixture of earth and clay, well beaten together, as devised by M. COINTEREAU, in his "*School of Architecture*," (8vo. Hilburghausen, 1793, in German); an ingenious work that, we believe, was originally published in the French language. Although we are persuaded that such a method of raising edifices is not only durable and economical, but the buildings also are thus effectually secured from fire, yet it will be of great importance to afford security to combustible dwellings already erected..... For this useful purpose, M. BOULARD, architect. at Lyons, has lately discovered a very simple remedy, attended with little expense or trouble, and admirably calculated to defend wooden materials from being consumed by flames, though exposed to their influence for *two hours*. After many tedious experiments, he found that a solution of *pot-ash* is the most efficacious liquid for resisting the action of fire, longer than any other fluid. This observation induced him to apply that substance in a kind of paint or coating on wood, which was completely rendered *fire-proof*. in the following easy manner: Dissolve such a quantity of pot-ash in cold water as that fluid is capable of holding in solution, wash or daub with it all the boards. wainscoating, shingles, &c. which are intended to be prepared. Then dilute the same liquor with a little water; add to it such a portion of fine yellow clay as will make the mixture of the consistence of the common paint employed on wood; and lastly, stir into it a small quantity of flour-paste, in order to combine both substances intimately. With this mixture, all wooden materials ought to be coated three or four times, similar to painted work. Thus, wood will be secured from the action of fire, though exposed to it for a time exceeding two hours; but the greatest advantage of this excellent preparation consists in the circumstance, that it prevents the wood from ever bursting into flames. M. BOULARD remarks, that 20lbs. of sifted yellow clay, $1\frac{1}{2}$lb. of flour for making the paste, and 1lb. of pot-ash, are sufficient to prepare a square rood (French measure and weight) of deal boards; so that the expenses, when compared with the importance of the object, are indeed trifling. It is further deserving of notice, that even furniture made of wood, such as chairs, tables, &c. and particularly the stair-cases, and flooring of dwelling-houses, may be so far enabled to resist the ravages of the fire, that they are only reduced to coals. or embers, without spreading the conflagration by additional flames: meanwhile, there are gained, at least, two hours, during which, all valuable effects may be removed to a place of safety, and the lives of the family at the same time rescued from all danger...See HOUSE.

FIRING-IRON, in farriery, is an instrument resembling the blade of a knife; which, being made red-hot, is applied to the hams. or to such other parts of the horse as may require it, for the purpose of cauterising and discussing preternatural swellings, such as farcy, knots, &c....This operation is called *firing*.

FIRKIN, an English measure

for liquids, which is the fourth part of a barrel; it contains eight gallons of ale, soap, or herrings, and nine gallons of beer. Two firkins make a kilderkin.

FISH, in natural history, an animal that lives in the water as its proper element. See ANIMAL Kingdom.

The most general, or popular division of these creatures, is into *fresh* and *salt* water fish. It has, however, been conjectured that they all naturally inhabit the ocean, and have only migrated into rivers.

According to LINNÆUS, there are about 400 species of this animal, with which naturalists are acquainted; but those yet unknown are supposed to be still more numerous, and as they are believed to live at great depths in the ocean, remote from the shores, many species will probably for ever remain undiscovered.

Having already treated of the different methods of angling for fish, under their respective heads of the alphabet, we shall at present confine ourselves to a few general observations.

Flowing of fish is a practice similar to that of blowing flesh, poultry, pigs, &c. and is adopted for the same fraudulent purpose. This operation is performed, especially on cod and whitings, by introducing the end of a quill or tobacco-pipe at the vent, and blowing through a hole made with a pin under the fin which is next the gill; thus making the fish appear to the eye large and full, though, when dressed, it will be flabby, and little more than skin and bones. Such imposition, however, may soon be discovered, by placing the finger and thumb on each side of the vent, and squeezing it considerably; the expulsion of the wind will be perceptible, the skin will collapse, and the fish appear lank and of little value.

In the *Gentleman's Magazine*, for 1752, we meet with the following curious account of a method of carrying fish alive to a great distance: Take an ounce of white sugar-candy; saltpetre about the size of a walnut; and a similar quantity of wheaten flour; incorporate these ingredients till they become of the consistence of powder. This quantity is sufficient for a pail of water: having provided a convenient vessel to carry the fish, crumble into it some white bread; and when the water begins to grow warm, and the fish put up their heads to the top, add a small quantity of this powder, which cools the reservoir, and preserves the fish. The water, if possible, should be changed every four or five miles, and the powder added, as occasion may require. By these means, trout may be carried above forty miles alive, and in good health.

[Cit. NOEL has written an interesting paper on the means to be employed for multiplying fish: and observes that there are many instances of fish being conveyed from one river to another, or from a river to a lake, and *vice versa*. This method has been employed with success in Germany in regard to shad, with which ponds, and pieces of stagnant, but clear water, with a bottom of sand and gravel, preferred by the shad to all others, have been peopled. Perch were conveyed from the river Leven, and deposited in Loch Long. The carp, a fish of warm climates has been successfully introduced into

the rivers and ponds of Prussia, Denmark and England. The Chinese dorado, that small fish, the brilliant gold and silver colours of which all admire, was brought to Europe from the Northern parts of China. This fish now thrives at Lisbon, and it is believed, near London. Fish originally produced in salt water, have voluntarily established themselves in fresh. Several lakes of Scotland possess salmon, and herrings abound in the rivers of the United States. The same fish, according to TWISS, is caught in the fresh water lakes of Ireland. Dr. FRANKLIN having observed in N. England, that the herrings ascended from the sea into one river of that country, while a single individual was never seen in another river, separated from the former by a narrow tongue of land, and which communicated also with the sea, this philosopher took the leaves of some plants on which the herrings had deposited their ova, already fecundated, and conveyed them to the river which was deprived of the annual visit of these fish. The success of this experiment surpassed his expectation; the ova were completely productive, and the following year the river was filled with a numerous shoal of herrings, which, since that time, have continued to frequent it. Dr. MITCHELL, of N. York, informs us, that he transported two dozen and ten yellow perch from Rochonkoma pond, in Suffolk county, Long-Island, to Success pond, in the town of North-Hampstead, a distance of 40 miles. In two years these few fishes multiplied so fast, that they might be caught with a hook in any part of the water, which is about a mile in circumference! "Planting" oysters, as it is termed, is a common practice on the Delaware coast. See HERRING.]

Feeding of fish....When they are kept in large pools or ponds, either boiled malt, or fresh grains, is a very proper food; thus, carp may be reared and fed like capons, and tench will also prosper. If reared in a stew, any sort of corn, or leguminous fruit boiled, especially peas and malt coarsely ground, are equally fattening.

Fish, in general, are less nourishing than other animal food, though they are not difficult of digestion, while in a fresh state; but, when *salted*, they partake of the stimulating and pernicious properties of beef, or pork, accordingly as they are lean or fat. Although the rancid and putrescent tendency of fish may, in a great measure, be counteracted by acid sauces and pickles, yet they should never be eaten by febrile patents and convalescents, in whose stomachs their fat is insoluble, and almost indigestible. On the whole, we are convinced from experience, that *salt-water* fish are lighter and more wholesome, and that among these, what are commonly called *white-fish*, are the most easy of digestion. Such as are fed in muddy ponds, or other stagnant waters, are, of all aquatic animals, the least conducive to health. With respect to the most proper method of curing and dressing fish, there can be no doubt that such as are dried in the open air, and afterwards quickly boiled, afford the most salubrious nutriment. But *we* cannot approve of either *fried* or *broiled* fish, especially when *butter* is used for these culinary processes: hence, we think it our duty to reprobate these luxurious customs, as being highly

pernicious to health; and to contradict, in the most solemn manner, the suggestions of a recent compiler, who has not hesitated, *indirectly*, to countenance the use of that hurtful animal oil. For, though liberally availing himself of the industry and talents of others, he has not even acknowledged the sources which supplied him with the *principal* part of a volume.

FISHING, the art of catching fish, whether by means of nets and spears, or of lines and hooks. The former are used in fresh and salt water, for the taking of large fish, which go in shoals; the latter are employed for catching single ones, such as bream, carp, &c. to which we refer.....See also ANGLING.

The most important point in fishing, is the proper season, together with the place, bait, and mode of application. In March, April, and September, the warmest days are the most successful for this sport, when the bait should be deep; for during those cool months the fish lie near the bottom. For fly-fishing, the most proper seasons are the months of April, May, or June, after a gentle shower of rain has beaten the insects down upon the water, without rendering it turbid; and the most promising hours are about nine or ten in the morning, and three or four o'clock in the afternoon: in still, warm evenings, however, fish will readily bite, till night approaches; because at those seasons gnats are flying in great numbers.

In the hot days of Midsummer, when the earth is parched up, little success can be expected in any water. Nor will fish bite during cold weather, unless the evenings be warm and serene. The north and east winds are particularly unfavourable to fishing, as well as tempestuous weather in general; but, if a gentle breeze prevail, it will considerably facilitate the operations of the angler. For farther particulars relative to the proper seasons, baits, lines, hooks, &c. for taking fish, we refer the reader to ISAAC WALTON's *Complete Angler*, 8vo. 1734, where he will find ample instructions, blended with considerable amusement.

FISHING-NET, a contrivance of a reticular texture, thus denominated, as it is appropriated solely to the taking of fish.

These nets are in general made by the hand; but, as that method is necessarily tedious, and inadequate to supply the demand in populous fishing ports, Mr. J. W. BOSWELL, of Barnstaple, Devon, in the year 1795, invented a machine for the purpose of weaving nets, for which the *Society for the Encouragement of Arts*, &c. in 1796, conferred on him a premium of fifty guineas. His loom is calculated to make 63 meshes at the same time, and by the same motion, with a perfectly fast knot, which does not differ from those employed by fishermen...nets thus manufactured have a complete selvedge, and are not liable to decay from the knots becoming loose, a circumstance of considerable importance to those employed in the fisheries. We regret that Mr. BOSWELL's ingenious machine is too complicated to give the reader a competent idea of its mechanism, without illustrating it by an engraving; and, as few persons in *domestic* life will attempt to make their own fishing-nets, we refer the curious reader to the 14th vol. of the *Transactions of the Patriotic Society*

above mentioned, where he will find an ample description, together with a plate explaining the whole of the machinery.

FISH-PONDS, are those reservoirs made for the breeding and rearing of fish. They are considered to be no small improvement of watery and boggy lands, many of which can be appropriated to no other purpose. In making a pond, its head should be at the lowest part of the ground, that the trench of the flood-gate, or sluice, having a good fall, may, when necessary, speedily discharge the water. The best method of securing the work, is to drive in two or three rows of stakes, at least six feet long, at a distance of about four feet, extending to the whole length of the pond-head, the first row of which should be rammed not less than four feet deep. If the bottom be false, the foundation may be laid with quick-lime: which, slaking, will make it as hard as a stone. Some persons place a layer of lime, and another of earth dug out of the pond, among the piles and stakes; and, when these are well covered, drive in others as occasion may require, and ram in the earth, as before, till the pond-head be of the height designed.

The dam should be made sloping on each side, and a waste left to carry off the superabundant water in case of floods of rains; the depth of the pond need not exceed six feet, rising gradually in shoals towards the sides, in order to allow the fish to *sun* themselves, and deposit their spawn. Gravelly and sandy bottoms, especially the latter, are well calculated to promote the breeding of these animals: and a fat soil, with a white rich water, such as the washings of hills, commons, streets, sinks, &c. is said to be the most proper for fattening all sorts of fish.

For storing a pond, carp is to be preferred, on account of its delicacy, quick growth, and prolific nature, as it breeds five or six times a year. This fish delights in ponds that have marl or clay bottoms, with plenty of weeds and grass, on which it chiefly subsists during the hot months.

In a late publication, we meet with the following singular method of furnishing a fish-pond with a variety of fish: About the latter end of April, or the beginning of May, take the root of a willow that stands near the water side, and is full of fibres; wash off the earth which adheres to it, then fasten it to a spike, and drive it into a river or pond well stored with fish: they will speedily be induced to deposit their spawn or roe in the fibres of the root. After a few days, (in cool weather, perhaps, *weeks*), remove the spike, with the willow root, from the pond; and convey it to that which you design to store, driving it to the depth of four or six inches under the surface of the water; and, in about a fortnight, a great number of young fish will appear. The root, however, should not be left too long in the first pond or river, lest the heat of the sun animate the spawn, and disengage it from the root.

Ponds should be drained every three or four years, and the fish sorted. In those which are kept for breeding fish, the smaller kind should be taken out, for storing other ponds; but a good stock of females, at least eight or nine years old, ought to remain, as they never breed before that age.

FISTULA, in general, denotes

any ulcerated and sinuous cavity, with callous and elevated edges, which extends to a carious bone.

This formidable disease is, according to the parts which it attacks, called either *fistula lachrymalis*, that is, a sinuous ulcer of the lachrymal sac or duct, beginning with a tumor between the inner cornea of the eye, and the side of the nose; or a *fistula in perinæa*, namely, an ulcer communicating with the urinary canal, but sometimes opening into the bladder; or *fistula in ano*, when the ulcer is in the vicinity of the rectum or straight-gut. The first generally appears in ricketty children, or such as are subject to glandular obstructions; the second may arise from wounds in the bladder and of the urethra, from external violence, &c. but is most frequently occasioned by certain diseases with which voluptuaries are punished; and the last is produced by whatever tends to form matter about the anus, by piles, soft tumors, hardened feces, or in consequence of irritation and inflammation, terminating in suppuration.

It would be needless to enlarge upon the treatment of this complaint, the cure of which cannot be entrusted to unskillful hands; nay, medical and surgical advice are often inadequate to relieve the unhappy sufferer, especially from the last species of fistula, after an operation has been ineffectually performed. Indeed, the frequent unsuccessful attempts of the most experienced operators, have encouraged a degree of quackery in this malignant disease, which ought never to be submitted to dabblers; as the delay of proper advice cannot fail to be attended with fatal effects. Hence we think it necessary to caution the unwary against the insidious attempts of those eccentric impostors (particularly in the west end of the metropolis) who extort large sums of money from the unhappy patients, under the specious promise of curing a fistula, *without cutting*.

After the disorder has been suffered to prey upon the internal parts, and the bones in the vicinity have become affected, or carious, we venture to pronounce that it is incurable. But, if the patient be of a *sound* constitution, and has not neglected himself at the *commencement* of the malady, he may doubtless be cured by *professional* treatment, an appropriate diet, consisting of light and nutritive food, and abandoning every kind of stimulating and heating aliment, both in a liquid and solid state. Hence game, pork, wine, spirits, coffee, and spices, are here equally improper. Lastly, we are inclined to believe, that the external use of *living snails*, or at least the expressed juice of them frequently applied to fistulous ulcers at their commencement, (especially after completely laying open the sinus), will have an excellent effect in stopping the progress of the disease; and, by sufficient perseverance, probably accomplish a cure. There are several well-attested cases, that this simple remedy has recently been found of excellent service in removing *scrophulous ulcers*, which had resisted every other mode of treatment.

Fits. See Convulsions; Epilepsy; Hysterics; and Spasms.

FIXED-AIR, an aerial fluid, which is disengaged from all substances liable to undergo the vinous fermentation, as well as by mixing alkaline salts and earths with acids. It is, strictly speaking, a *gas* which

is essentially different in its properties from atmospheric *air*, as the former is unfit to support either the respiration of animals, or the burning of a candle; being likewise specifically heavier than the common air we breathe. From its acid properties, it has been variously denominated *aerial acid*, *cretacious acid*, or *carbonic acid:* and, from its noxious qualities, it has received the name of *mephitic gas*. The appellation of *fixed air* has been applied to it from its readily losing its elastic property, and fixing itself in various bodies, especially those which are of a calcareous nature.

Fixed air was first discovered by Dr. Black, who, in consequence of various experiments, found that chalk, and the other earths reducible to quick-lime by calcination, consist of an alkaline earth, which is soluble by itself in water; but which, when combined with a large quantity of fixed air, becomes insoluble; losing the properties of quick-lime, and assuming the appearance those earths naturally have, when not reduced to a calcareous state.

Dr. Black observed the same phenomenon in white magnesia, and in alkalis both fixed and volatile. Their effervescence with acids, and their mildness, depend on the fixed air which these bodies contain; because alkalis and calcareous earths become in a high degree *caustic*, when divested of that gas. He farther remarked, that *fixed air*, had different degrees of affinity with various substances; being stronger with calcareous earth than with fixed alkali; with the latter than with magnesia; and with this than with volatile alkali.

This new gas was introduced into the catalogue of medicines, by its strongly *antiseptic* properties: it cannot, however, on account of its fatal effects, be inspired in large quantities, though in small portions it may be inhaled without danger.

Dr. Percival first administered it on a large scale, and directed his patients, in more than thirty cases of pulmonary consumption, to inspire the steam of effervescing mixtures of chalk and vinegar through the spout of a coffee-pot. By this treatment, the hectic fever was, in several cases, considerably abated, and the matter expectorated became less offensive, and better digested. Although Dr. Percival was not so fortunate as to effect a cure in any one instance, yet the late Dr. Withering met with better success; as one of three patients was thus restored to perfect health; another received great benefit, and was much relieved; and the third was kept alive by inhaling this gas for more than two months. Fixed air, however, can only be employed with advantage in those stages of pulmonary consumption, when a purulent expectoration, or a rupture and discharge of an abscess in the lungs, have taken place: in such cases, this remedy affords a powerful palliative.

Farther, it is equally useful when applied to foul ulcers; and instances have occurred, in which the sanies, or corrupt matter issuing from *cancers*, has been sweetened, the pain alleviated, and a better suppuration produced, even after the carrot-poultice had failed. But, though fixed air evidently checks the progress of a cancer, there is reason to apprehend that it never will effect a cure.

Considerable benefit has also

been received in ulcerated sore-throats, from inhaling the vapours arising from effervescing mixtures. This remedy ought, however, by no means to exclude the use of other antiseptic applications.

In that dreadful disorder, the malignant fever, wines strongly impregnated with fixed air may be administered, with a view to check the septic ferment, and to neutralize the putrid matter in the stomach and intestines. If the patient's common drink were thus prepared, it might be attended with beneficial effets. As the latter stages of malignant fevers are generally accompanied with putrid diarrhœas, this evacuation ought not to be restrained by the use of *astringent* medicines; because the retention of putrid matter in the body will aggravate the delirium, and increase the vehemence of the fever. And if the disorder be suffered to take its usual course, death is the inevitable consequence. In cases of this dangerous nature, mephitic or fixed air, produced from a mixture of chalk and oil of vitriol, has been injected into the intestines, by means of the instrument employed for tobacco clysters; by which aplication the violence of the diarrhœa was quickly abated; the heat and fetor of the stools corrected; and every alarming and dangerous symptom in a short time removed.

The last disorder in which the use of fixed air has been attended with success, is the *calculus*, or *stone*, of which it is said to be an excellent solvent; but, as the experiments made on this subject have not hitherto accurately determined its efficacy, we cannot speak of it with any degree of confidence. See STONE.

FLAG: See FLOWER-DE-LUCE.

[FLAG, Sweet. See ACORUS.]

FLANNEL, a kind of light, porous, woollen stuff, woven on a loom with two treddles, in a manner similar to baize.

This is unquestionably one of the most useful articles of wearing apparel; and it is much to be regretted, that it is not more generally worn, as we are fully persuaded, that it would be the means of preventing many diseases.

The principal objection to the wearing of flannel appears to be, that it irritates the skin, and occasions disagreeable sensations...... these, however, continue only for a few days, and the subsequent advantages, thence resulting, amply compensate for such temporary uneasiness. Both young and aged would derive from it equal advantages. We do not, however, mean to insinuate, that flannel next the skin should be *universally* and indiscriminately worn by infants and young persons; though it is an ill-founded assertion of its adversaries, that it has a tendency to produce eruptions; as it evidently opens the pores, promotes perspiration, and thus removes the principal *cause* of cutaneous diseases that originate from an obstructed and irregular state of the skin.

There are, however, certain cases in which *flannel* cannot, with strict propriety, be used as an under-dress. In order to enable the reader to ascertain whether its constant use be advisable or not, we shall point out the leading circumstances which may, in this respect, influence his determination: it is a *salutary* dress to all those, in general, who have passed the meridian of life, or the 35th year of their age; though they should not have been accustomed to it from their

infancy; to persons of a cold and phlegmatic habit, or leading a sedentary life: to such as are subject to fits of the gout, rheumatism, frequent colds and catarrhs; to individuals very susceptible of impressions connected with the vicissitudes of air, weather, and climate; as well as to nervous patients, and those who have recently recovered from severe chronical diseases.... On the contrary, the wearing of flannel next the skin may be *injurious* to constitutions so organized that they are liable to profuse perspiration, on taking even moderate exercise; or to those who are already afflicted with scorbutic or other eruptions of the skin; or, lastly, to all such irritable and whimsical persons as possess neither bodily nor mental vigour sufficient to overcome the first uneasy sensations which is occasions. But we are fully warranted to assert, from daily experience, that the habitual use of this beneficent texture has essentially contributed to the recovery of numberless ricketty children, not less than to the saving of others who were born of feeble and enervated parents. In short, there is every reason to believe, that a *more general* adoption of this salutiferous cloth might prevent many fatal inflammations of the throat, breast, lungs, &c. to which the poorer class of people are remarkably liable; and thus preserve the lives of multitudes who now become a prey to our damp and variable climate.

FLATULENCY, a very common disorder, arising from vapours generated in the stomach and intestines. It occasions distensions, disagreeable sensations, and frequently a considerable degree of pain.

Sedentary persons, and those who are of a delicate constitution, especially women, are very liable to attacks of this complaint, which is generally induced by the eating of peas, beans, and other leguminous food. Animal fats, especially those of mutton and veal, if immoderately used, with large draughts of liquor immediately after eating them, are apt to turn rancid on the stomach, and to be accompanied with flatulency. The drinking of turbid or feculent liquors, whether new or old, as well as excessive potations of *hot tea*, produce a similar effect. The habit of the patient likewise contributes towards the generation of these causes; so that in phlegmatic constitutions, where the bowels are of a dry and costive disposition, this complaint is most frequent and painful.

The general method of treating flatulency consists in administering hot aromatics, which, however, ought to be taken with great caution, as they often irritate rather than relieve the parts affected...... The poorer class, who are subject to flatulency, usually have recourse to drams, low wines or punch...... remedies which are extremely improper; and, though they afford a temporary relief, eventually impair the appetite and constitution.

The safest mode of treatment is, to keep the bowels gently open by means of *clysters*, prepared of half a pint of mutton-broth, in which half an ounce of caraway-seeds has been boiled, adding two spoonfuls of sweet-oil, and one of soft sugar; which should be repeated three or four times in twenty-four hours.... During the intermediate days, gentle laxatives, consisting of single drams of vitriolated tartar, dissolved in one ounce of cinnamon wa-

ter, may be taken every three hours, till they produce the desired effect, in order to attenuate the viscous matter in the bowels....See also COLIC.

But if the paroxysms of flatulency be violent, and accompanied with vomiting and other distressing symptoms, so that neither absorbents nor carminatives relieve the patient, we are informed by Dr. REICH, that great and immediate benefit has been derived from his method of extracting the air from the bowels, by means of a common clystering syringe; or, still more effectually by the machine of which we have given a short account under the article AIR. This useful instrument, we understand, is manufactured by GEORGE GORING, an ingenious turner of Furth, a town in Franconia, who sells it at a price of from 10*s*. to 18*s*.

FLAX, or *Linum*, L. an indigenous plant, consisting of four species, of which the following are the principal:

1. The *usitatissimum*, or COMMON FLAX, which grows in corn-fields, and sandy pastures, and flowers in the month of July.... This valuable plant thrives most luxuriantly on ground newly broken up; which it ameliorates, if it be sown only every sixth year. The best preparatory crops for flax are those of hemp and potatoes. In the fens of Lincolnshire, hemp is sown the first year on a good free open loam, that has been well tilled, the soil being properly manured with pigeon's dung; the second year again hemp is cultivated without any manure; and in the succeeding year followed by flax.

With respect to the quality of *linseed*, from which *flax* is propagated, that imported from Riga is generally supposed to be the best, and is sown broad-cast with clover, in the proportion of 2, or 2½ bushels per acre. Experience however, has evinced, that any other seed would be equally successful, if it were properly kept for six or seven years before it is sown; for the merchants of Riga frequently import linseed from Germany and other countries, which, after several years they again furnish with the same seed, but at an advanced price. It would farther be an useful practice, to exchange linseed among farmers living at some distance; as it has been observed that it improves, when cultivated in a different soil and climate....See also LINSEED.

In order to prevent the depredations of birds on this valuable seed, circumspect farmers sow it after sun-set on land well pulverized, and harrow it in early the next morning, before the sun rises.... Thus the seed, being moistened by the night's dew, is easily enveloped with earth, and rendered invisible to birds....Another great enemy to the prosperity of the flax-plant, is the parasatical weed called the Greater DODDER (which see), or *Cuscuta Europæa*, L....BECHSTEIN communicates the following remedy, by which it may be easily and completely extirpated:....To every bushel of linseed, take two drams of camphor reduced to powder, by adding fifteen drops of spirit of wine; and mix it well with the seed on the evening when it is to be sown.

As soon as the crop attains the height of four inches, it will be requisite to weed it; an operation which ought to be performed with the greatest care, that the flax may not be trodden down. If it be al-

lowed to grow longer, the stalks will be so much bent and broken, that they never regain their former straightness. When the weeds are carefully eradicated, they should be carried off the field, and on no account be suffered to lie in the furrows, because they often strike root again, and thus injure the growth of the flax.

This plant becomes ripe when it is in full blossom; but, if it be intended to stand for seed, it will not attain to maturity till the milky juice which it affords is dried up; at which time it is to be *pulled*, in order to be prepared for the manufacturer.

The first process which flax undergoes, is that of *rating*, or steeping it in water, to loosen and separate the rind from the stalk. The early flax is generally watered by laying it in bundles, in a pond or reservoir of soft water, where it is pressed down by stones, or other heavy bodies. In the course of a week, the rind will be sufficiently loosened, when the flax ought to be removed from the water, spread out in the air, and dried. Great skill and precaution are necessary in this part of the operation; for should the flax be left too long in the water, the filaments or threads will become rotten and useless: it will therefore be preferable to take it out rather at an earlier period, than to leave it too long in the pits.

Another process is that of *dew-ripening:* which is performed by spreading the flax on the grass, so that the joint action of the rain and dew produces an effect similar to that of rating. In some parts of Germany, it is never steeped in water, but only exposed for several weeks to the air, rain, and sun; by which it is said to become finer and softer than by any other method.

To these operations may be added that of *rippling*, namely, the separating of the seed from the stalk, by passing the flax through a kind of comb before it is rated or watered. These combs are made of iron, the teeth of which are so closely set together, that the heads cannot pass through, and consequently are pulled off.

Some cultivators, however, beat the seed out in the field where it grew, instead of rippling, by means of a heavy piece of wood fastened to a bundle; after which it is sifted clean into a large sheet.

In this state the flax is ready to be manufactured into LINEN; for a short account of which process, we refer the reader to that article.

[Dr. LOGAN informed the *Philadelphia Society for promoting Agriculture*, that he cultivated flax and potatoes in the same field: each crop had an equal quantity of manure; on gathering an excellent crop of flax in July, the ground was immediately ploughed and sowed with turnips; and produced one hundred bushels of good turnips per acre: on removing the crop of potatoes and turnips, about the middle of October, the ground was put into wheat; the wheat, on the flax and turnip ground was fully equal, if not superior, to the wheat on the potatoe ground.

Flax, he says, requires a rich loam or clay; *rots best in August*, and was informed by experienced farmers, that the injury which flax is said to receive by the heat of the mid-summer sun, is by no means equal to the benefit it receives by being quickly maturated.

The following directions for cul-

tivating flax are given by Mr. Deane, in his *N. E. Farmer*.

"Flax requires more care and nicer culture than any that we are concerned with. It should never be sown on a soil that is not rich, and well wrought.

Sandy and gravelly soils are by no means suitable for flax. It is not a plant that requires much heat; therefore it answers well in cold latitudes. The cooler kinds of soil, such as clay and loam, and the black earth of drained lands are suitable for it. But they should be well pulverized and manured. In wet seasons it commonly does better than in dry ones: So that though it may sometimes do well upon high land, it is best not to risk it: rather choose a soil that is naturally low and moist. If it be too wet, little trenches may be made, thirty or forty feet asunder, to drain off the water. The land must be in good heart, either naturally or by the help of manures. But new dung should not be laid on it at the time of sowing; nor any thing else that will make weeds increase; for in no crops are weeds more pernicious than in flax. It is often found that they entirely kill most of the plants; and the remaining ones will be bushy and mishapen, and have a weak coat on them, being too much deprived of the rays of the sun.

The manure for flax ground should rather abound with oils than otherwise, and be rather cooling than hot. The old rotten dung of black cattle and swine is most suitable, or a compost in which these dungs are the principal parts. A top-dressing of sea-weeds, after the flax is come up, is greatly recommended. But I rather choose to enrich the ground a year before, than when the flax is sowed. A crop of potatoes is good to precede one of flax. I plough up green sward, and dung it well with such manures as are suitable for flax, and plant it with potatoes. This crop does not abate the strength of the soil, but rather increases it. It makes the ground mellow, and does not encourage weeds: It is therefore in fine order for flax the year following.

Green sward will sometimes do well the first year; but it must be a fat deep soil, such as some intervales are; and should have a dressing of old dung, well pulverized, and mixed with the soil by harrowing: For if it be not well mixed, the crop will be of various lengths, which is inconvenient, and occasions loss.

In England they sow two bushels of imported seed on an acre. When they sow seed of their own growing, they allow more. In this country some afford but one bushel. The best quantity may be about six or seven pecks, or a little more or less, according to the strength of the soil. For it is not with this crop as some say it is with grain. Of grain, rich land requires, they say, less seed; because what is wanting in seed, is made up in stooling. But however this may be, it is most certain that the stooling of flax will be hurtful. That is the best flax, where a root bears but one spire, or stalk. It will be straighter and taller, as well as more soft and pliant. The ground should be ploughed in the fall, and again in the spring, the clods broken, and the stones taken out.

Flax should be sown early, unless the soil be too wet. A small degree of frost happening after it is up, will not kill it. That which

is sown early has the strongest coat, as it is slower in its growth.

A calm time should be taken to sow the seeds: Otherwise it cannot be sown even, it being more difficult to sow than most other seeds.

Flax-seed should be changed once in two or three years, or it will so degenerate, as to be unfit for sowing. It is worth while to change it every year. It is certain, that seed from less than a hundred miles distance, has been known to make a crop more than double. It has done so in this country. After the seed is sown, it should be covered, either by bush-harrowing or by rolling, or both.

When flax comes to be about four inches high, if weeds appear among it, they should be pulled up by careful hands: And to prevent wounding the flax, the weeders should be bare-footed. If they should tread it down at this age, it will soon rise up again. The weed commonly known by the name of false flax, is not in blossom till the flax is nine inches or a foot high. At this time the weed is easily found by its blossoms; and what escaped at the first weeding, should at this time be carefully eradicated.

The next operation in the culture of flax, is pulling it: In doing which, care should be taken not to mix long and short together in the same hands, but to keep all of the same length by itself. The reason of which caution is so obvious, that I need not mention it.

The time of pulling flax depends upon its growth and ripeness, and upon the proposed method of managing it afterwards.

That which is to be watered, should be pulled as soon as the blossoms are generally fallen off. Some think the harl is stronger at this time than afterwards, as none of the oily particles are yet passed up into the seed. It is undoubtedly better for the soil, that it be pulled at this time, than when the seed is ripe. The longer it stands to ripen, the more oily particles it will draw from the earth.

Being pulled, and tied up in hands, the flax, should be put into the water without delay. A pond is preferable to running water, both as it is warmer, and not so apt to deprive the flax of its oily and glutinous substance. In four or five days, according to the warmth of the water, it will be time to take it out. But that the true time may not be missed, it must be carefully watched, and trials made by drying and breaking a little of it, that so the harl may not get too much weakened.

After it is taken out, and has lain dripping a few hours, it must be spread on a grassy spot, and dried. If it should happen to be not watered enough, the want may be made up by letting it lie in the dews for a few nights; and if a gentle rain happen to fall on it, it will be the whiter and cleaner.

The flax that goes to seed should not stand till it appears brown, nor till the seed be quite ripe. It is not necessary on account of the seed; because it will ripen after pulling. When the leaves are falling from the stalks, and the stalks begin to have a bright yellow colour, the bolls just beginning to have a brownish cast, is the right time for pulling.

The rind is to be loosened from the stalks, not by watering, lest it be too harsh, but by spreading it on the grass to receive the nightly dews. When it is done enough; the rind will appear separated from

the stalk at the slender branching parts near the top ends. When it is almost done enough, it should be turned over once or twice.

It was formerly the practice, after drying the flax in the field, to house it till some time in September; and then to beat off the seed and spread the flax. But this often interfered with fall feeding: And it was necessary it should lie the longer, the weather being cool.... Sometimes it has been overtaken by snows.

I prefer the method I have lately gone into, as it saves labour; which is to spread the flax as soon as it is pulled. I do it on a spot where the grass is not very short, which prevents sun-burning. As the weather is hot, it will be done in about ten days or a fortnight. I then bundle and beat the seed off, and lay it up in a dry place till winter. While it lies, most of the seed will shell out.

In the most frosty weather it will dress easily without warming before a fire, or baking it in an oven. The "*Complete Farmer*" describes and represents machines for breaking and scutching flax.

To prevent the ill effect of so severe a crop as flax is to the soil, it should be ploughed without delay after the crop is taken off. As flax is pulled early, the ground thus gets a kind of summer fallow, which will do much towards recruiting it, and weeds are prevented from going to seed."

Mr. Chancellor Livingston found that a piece of flax sown by a tenant upon a dry sandy declivity, (about half an acre), looked extremely sickly, was recovered in a surprising manner by strewing 3 bushels of gypsum on the surface in the morning, while the dew was on the ground. It stood a very dry season, and yielded abundantly.

An acre of flax, raised in 1788, by Mr. A. Roberts, produced 300lb. of flax, which sold for 8*d*. per lb.

300lb. of flax, which sold for 8*d*. per lb. . . .	*L*. 10	0	0
9 ½ bushels of seed at 3*s*. 11*d*. .	1	17	2½
	L. 11	17	2½
Expenses . .	7	16	6
Neat profit . .	*L*. 4	0	8½

Amer. Mus. vol. 9. p. 201.]

Many attempts have been made by ingenious persons, to improve flax, or to render it finer, softer, and equal to silk in spinning. In Ireland, this object has, in a great measure, been attained by boiling it for several hours in sea-water, with the addition of a ley made of unslacked lime, and two or three parts of pot-ashes: thus we have seen the coarsest part of flax, or *tow*, considerably changed in its texture, so as to resemble the finest *lint*....In the 69th Report of the *Economical Society of Leipzig*, printed in 1797 (in German), we meet with the following process for converting flax into a silky substance, communicated by Count Harrsch, director of the mines in Russia.... Take pure combed flax, tie it up into rollers covered with white buckram, fasten them with packthread, and deposit them for a fortnight in a damp cellar. Then open the flax, and place it under the cylinders of a common mangle, where it should be rolled over five or six times, in a manner similar to that pursued with linen. Next, the flax should be passed through a fine brass comb. This process of mangling and combing must be repeated a second and third time, but the combs ought to be pro-

gressively finer. By such treatment (the Count informs the Society) a very fine, tender, and glossy flax, may be obtained, scarcely inferior to *China silk;* and, though it loses more than one-third of its substance, yet the refuse, or tow, is uncommonly fine, and still useful for the manufacture of ordinary linen.

He farther observes, that, after each combing, particularly the first, the filaments appear flat and compressed, but that they recover their roundness by the subsequent operation. Flax thus prepared, cannot, by mere contact, or the sense of feeling, be distinguished from silk, and is fit to be manufactured into the finest cambric, and Brabant lace.

Of the utility of flax or linseed, in *fattening cattle*, we have already treated in vol. i.

Beside these various purposes, flax may also be considered as a *manure:* for the land on which it is spread, in order to prepare it for housing, is thus in a considerable degree ameliorated; and, if rated flax be laid on a coarse, sour pasture, the nature of the herbage will be totally changed; and the sweetest grasses will in future grow on such indifferent soil....The water, too, in which the flax is immersed, if properly sprinkled on land, by means of watering carts, will produce a very fertilizing effect, and increase its value ten or fifteen shillings per acre. But this water is of so poisonous a nature to cattle, that the practice of macerating or steeping flax, in any pond or running stream, is, by the 33d Henry VIII. c. 17, prohibited under very severe penalties.

2. The *catharticum*, or Purging Flax, or mill-mountain, is an annual plant, growing in dry meadows and pastures, and flowering from June to August. It is eaten by horses, sheep, and goats....An infusion of two drams of the dried plant is an excellent laxative, and has been given with advantage in obstinate rheumatisms.

FLAX, TOAD, the Common Yellow, or *Antirrhinum Linaria*, L. an indigenous perennial plant, which grows in barren meadows, pastures, and road sides, and is in flower from July to September.

Cows, horses, and swine refuse this noxious, and, according to Bechstein, poisonous weed; nor is it relished by sheep and goats.... An infusion of the leaves, however, has been used as a diuretic, and purgative; a decoction of the flowers is said to be very efficacious in cutaneous disorders. An ointment prepared from the leaves, is reputed to afford considerable relief in that painful malady, the piles....In dyeing, Suckow and Dambourney remark, that the fresh herb, while in blossom, imparted an olive colour to woollen cloth and silk.... Bohmer thus obtained only a weak yellow liquor, of a greenish shade.

[This detestable weed, which is known in Pennsylvania by the name of *Ransted*, is said by our botanists not to be a native of the United States. Did the importer of it know the injury he has done by its introduction, he could not fail to regret the pains he took on the occasion.

Ransted abounds in an acrid oil. The juice mixed with milk is a poison to flies. The distilled water or juice of the plants, used as a cataplasm, is an approved remedy for the piles, according to Ray, Haller, and Curtis.

It is highly injurious to our grass

lands, and is now said to have passed the mountains. It is extremely difficult to eradicate.]

FLEA, or *Pulex*, L. in zoology, a genus of insects requiring no particular description.

Want of cleanliness remarkably contributes to the generation of fleas; as the females deposit their eggs, each from twenty to thirty, in damp and filthy places, within the crevices of boards, on rubbish, &c. whence they emerge in the course of six or eight days, in the form of greasy whitish maggots. When a fortnight old, they envelope themselves in a small chrysalis, from which they sally forth, after ten days existence, in the form of fleas. In the winter, these different transformations require a period of six weeks, but in summer only a month. They probably do not live longer than *one* year; though it is said, that fleas have been kept on little golden chains for *six* years. As they are able to draw a weight eighty times greater than that of their own bodies, some frivolous persons have occasionally kept them harnessed to miniature carriages, &c. Leaping also is a singular proof of their muscular strength; as, by pressing the belly downwards, contracting their legs, and then suddenly expanding them, these creatures dart forward to a distance of 10 or 12 inches.

Children and females are remarkably liable to the attacks of this little enemy; a circumstance which must be attributed to their more tender skin, their purer blood, longer clothes, and, in some individuals, perhaps to a peculiar state of perspiration. Cleanliness, and frequent sprinkling of the room with a simple decoction of wormwood will soon extirpate the whole breed of these troublesome vermin; and the best remedy to expel them from bed-clothes, is a bag filled with *dry moss*, the odour of which is to them extremely offensive. Others cover the floors of the rooms where fleas abound, with the leaves of the alder tree, while the dew is on the foliage, to which these insects fondly adhere, and thus may be easily destroyed...... Mercurial ointment, sulphur, and fumigation with the leaves of penny-royal, or the fresh-gathered foliage of that plant, sewed up in a bag, and laid in the bed, are also remedies pointed out for the expulsion of fleas.

Dogs and cats may be effectually secured from the persecutions of these vermin, by occasionally anointing their skin with sweet oil.

FLEA-BANE, the Great, or Plowman's Spikenard, *Conyza squarrosa*, L. an indigenous biennial plant, growing in mountainous meadows and pastures, in a calcareous soil, and producing yellow flowers in the months of July and August.

This plant possesses the odour of musk; the smoke, occasioned by burning it, was formerly much employed for the destruction of fleas, gnats, and other insects. It was also recommended in cutaneous disorders, but is at present exploded from the shops. In a similar manner has the Canada Flea-bane, or *Erigeron Canadense*, L. lost its reputation, both for banishing fleas, and answering other superstitious incantations; for which it was celebrated in former times.

FLESH-MEAT, or the flesh of animals prepared for food, is an important object of domestic eco-

nomy. In this place, however, we shall communicate only the most proper and effectual ways of preserving such meat in a fresh state, especially in the hot days of summer, as we treat of its relative salubrity and influence on health, under the distinct heads of BEEF, MUTTON, PORK, VEAL, &c. as well as under the general head of FOOD.

In a work entitled "*Miscellanea Curiosa*," by Mr. JONES, we find an easy method of preparing flesh-meat, without spices, and with very little salt; yet so as to keep good, and always ready for eating, for two or three years, and in the warmest climates. He gives us this account of the Moorish Elcholle, made of beef, mutton, or camel's flesh, but chiefly of beef; which is uniformly cut in long slices, well salted, and suffered to lie twenty-four hours in the pickle. It is then removed from those tubs or jars, into others filled with fresh water; and, when it has lain a night, it is taken out, put on ropes in the sun, and air to dry. When thoroughly dried and hard, it is cut into pieces of two or three inches long, and thrown into a pan, or cauldron, which is kept ready with boiling oil and suet sufficient to cover it; thus it is boiled, till it be very clear and red on cutting it; when it is again taken out and set to drain. After having undergone this process, it stands to cool, while jars are prepared for storing it; at the same time pouring upon it the liquour in which it was fried; and, as soon as it is thoroughly cold, the vessels are closely stopped. Preserved in this manner, it will remain hard, and keep two years: indeed, the hardest is considered as the best and most palatable. Thus it is brought to table by the Moors, who sometimes fry it with eggs and garlic, sometimes stew it, and squeeze on it the juice of lemon. It is affirmed to be a very good dish, either hot or cold.

Another method of preserving flesh-meat, especially veal and lamb, is practised in Germany, and consists simply in immersing them in skimmed milk, so as to cover the whole joint. In warm weather, the milk should be changed twice the first day, and once in twenty-four hours; but, in a cool temperature it is sufficient to renew it every two or three days. Thus, the meat may be kept in a sweet state for several weeks; but it ought to be washed in spring water before it is dressed. Game and beef, however, cannot be preserved in the same manner, and therefore should be wrapped in a clean linen cloth, and buried in a box filled with dry sand, where it will remain sweet for three weeks, if deposited in an airy, dry, and cool chamber.

One of the cheapest means of preventing putrefaction in flesh-meat, would be that of covering it with *charcoal* powder; but experiments are still wanting to ascertain its effects on animal substances of different kinds. We think, however, there can be little doubt entertained of the successful result. With respect to the best method of *pickling* meat, we refer to the articles BEEF and PICKLE.

[Under the article BEEF, in the first vol. ample directions were given for salting beef. The following additional account of the result of a succesful trial to preserve beef, killed in very hot weather, in August, is communicated by Mr. COOPER, of Northumberland:

The animal fasted a night and

day before being killed. About nine o'clock in the evening he was killed, and cut up immediately.

Persons stood by to keep off the flies and insects, every piece was coarsely and quickly wiped, and then rubbed with finely pounded salt, and instantly put into a barrel in a cool cellar. The next night the pieces were taken out, drained for half a minute, put into another barrel, and the following pickle was poured on them *boiling hot*:

To every two gallons of water were added 2lbs. of salt, and 2 oz. of saltpetre. This was poured on boiling hot, 1st. to kill the egg of any fly-blows: 2dly, to corrugate the external fibres of the meat where it is first apt to taint.

N. B. The meat was deprived of all the large bones.

In about a week the meat was taken out of pickle; the pickle boiled and scummed, and again poured on hot. The meat kept perfectly well.

The pickle of meat should be often examined, and once a fortnight boiled and scummed.]

FLEUK-WORM, or Flewk-worm, *Fasciola hepatica*, L. an insect, of the size and shape of a child's finger-nail: it creeps up the gall-ducts from the intestines, and, preying upon the livers of sheep, occasions coughs and consumptions in those animals.

Sheep pasturing in moist grounds, are frequently attacked by this insect which Dr. Darwin conjectures to arise from the bile becoming too much diluted, in consequence of their watery food; so that it does not possess sufficient acrimony to prevent the depredations of flewk-worms.

The remedy in general prescribed, is to dissolve one ounce of salt in water; but Dr. Darwin suggests, that the salt may be used with greater advantage, if hay were moistened with the solution, which would thus supply more wholesome nourishment, than is usually given to sheep troubled with these vermin.

FLINT, or *Silex*, L. a kind of opaque stone, which is, in general of a roundish form, covered with a white crust, of a smooth uniform texture, and so hard, as to emit fire, when stricken against steel. It is chiefly used in the manufacture of glass. For this purpose, the hardest flints are selected, such as will resist the file, and become white when calcined. They are first cleansed from the white crust adhering to them; then burnt in a strong fire, and thrown, while red-hot, into cold water. After cleaning them of the ashes, the flints are finely pulverised in an iron mortar, and passed though a sieve. Weak aqua-fortis is next poured on the powder, with a view to dissolve any particles of iron, perhaps acquired from the mortar. This mixture is to be repeatedly stirred, and then left to subside, after which the liquor is to be poured off the powder, washed several times with hot water, and, lastly, dried. In this state it is fit to be converted into glass.

In the year 1742, an oil was prepared from the flints by Messrs. Betton and Willington, of Shrewsbury, for which they obtained a patent. It may be made of 4 oz. of flints calcined, pulverized, and mixed with 12 oz. of salt of tartar. These ingredients are next to be melted together in a crucible over a strong fire, and *run* into an open glass, which strongly attracts moisture from the air, and

is completely soluble in water, excepting a small portion of earthy matter. This glass is then to be pulverized, and set in a cellar where it will spontaneously liquefy into an oil; which the patentees have affirmed to be efficacious in curing obstinate rheumatisms.... We doubt, however, the utility of this medicine, as there are other local remedies, more proper and efficacious in that painful complaint...See RHEUMATISM.

FLIXWEED. See CRESS.

FLOATING LAND. See IRRIGATION.

FLOOR, in architecture, the area, or lower part of a room, which is in general covered with boards.

The best wood that can be selected for this purpose, is *yellow* deal, thoroughly seasoned; which, if well laid, will for a long time retain its colour; whereas the *white* sort, by frequent washing, becomes black, and presents a disagreeable appearance. The joints of the boards are usually made plain, so as barely to touch each other; but, as the materials are not always perfectly dry, the boards not unfrequently shrink, and the water runs through them every time they are washed, by which the ceiling underneath is injured. To remedy this inconvenience, they should always be made either with edges, so as to fold over each other about half an inch, or with what is called *dove-tails*: in the latter case, the lower edge is nailed down, and the next driven into it, so that the nails are effectually concealed.

In the habitations of the labouring classes, the floors are generally made of loam. The best materials for this purpose are two-thirds of lime, one of coal-ashes, and a small portion of clay. The whole of these ingredients, is to be well tempered with water, and left to subside for a week or ten days, when it is to be worked up again. This operation should be repeated in the course of three or four days till the mixture become smooth and glutinous, when it will be fit for use. After the ground is made perfectly level, the composition is to be laid on the depth of two and a half, or three inches, and carefully smoothed with a trowel. The hottest season of the year is the most proper for applying this mixture, which, when completely dried, will make a most durable floor, especially for malt-houses...See COUNTRY-HOUSES.

FLOUNDER, or *Pleuronectes flesus*, L. a fish which abounds in all parts of the British sea, and is also found in rivers, a considerable distance from the shore. It may be easily distinguished from plaise, or any other fish belonging to the genus, by a row of small, but sharp spines, which surround its sides, and are placed at that part where the fins are united to the body: a similar row marks the side-line, and extends half way down the back. The upper part of the body is of a pale brown, which is sometimes marked with a few spots of greasy yellow.

Flounders seldom grow to any size in the rivers, few exceeding the weight of five or six pounds; they are, however, preferred to those which are caught in the sea; being much sweeter, and at the same time having a more delicate flavour.

FLOUR, the meal of wheat, rye, &c. finely ground and sifted.

We have already stated, that

corn is the prey of a variety of insects: when converted into *flour*, it is subject to the depredations of another race of destroyers, which multiply in it so rapidly, that in a very short time they wholly consume its substance. These insects are of an oblong, slender form; their heads are provided with a kind of proboscis or snout, with which they take in their food; their body is composed of several rings. They do incalculable damage to the flour deposited in magazines for armies or other public uses; and after they have insinuated themselves into any parcel, the only method that can be adopted for saving the whole quantity is, to convert it immediately into bread.

In order to prevent such noxious vermin from breeding in flour, this valuable commodity should be kept thoroughly *dry*, as well as the barrels into which it is packed: with such precautions, if the flour be placed in a cool and airy room, it will be effectually preserved..... Sometimes, however, it happens, that though every attention be bestowed on it, flour becomes *sprit*, or damaged, and thus acquires an unpleasant flavour. This may be remedied by mixing a quantity of ground rice (in the proportion of one pound to ten of flour) with the usual quantity of yeast and water; keeping the mixture before the fire for the space of two hours; at the expiration of which time, the whole may be wrought into bread, in the common manner: thus it will be totally divested of its disagreeable flavour.....See also Baking.

The proportion of flour, which a bushel of grain affords, greatly varies. A bushel of Essex wheat, Winchester measure, weighs upon an average about 60lbs. which, when ground, will yield (exclusive of the loss incurred by the grinding and drying) $45\frac{1}{2}$lbs. of the flour called *seconds*, which alone is used for baking throughout the greater part of England, and which affords the most wholesome, though not the whitest bread. Beside the *seconds*, such a bushel of wheat yields 13lbs. of polard and bran: the total loss in grinding seldom exceeds one pound and a half.

A correspondent of the Editors of the *Encyclopædia Britannica* (Article Bread,) states, that he weighed two bushels, Winchester measure, of *white* and *red* wheat, the whole of which amounted to 122lbs. This wheat was ground under his own inspection, and yielded $121\frac{1}{2}$lbs. of meal, so that the waste or loss in grinding the two bushels, amounted only to *half* a pound. The meal was also dressed in his presence, and produced $93\frac{1}{2}$lbs. of *seconds*, and $25\frac{1}{2}$ lbs. of pollard and bran, so that the whole loss in the two bushels, both by grinding and dressing, did not exceed two pounds and a half. The bran and pollard were also dressed in a bolting mill, and produced

	lbs.	*oz.*
Sharps	6	0
Fine Pollard	5	8
Coarse ditto	7	8
Broad Bran	5	8
	24	8

One pound only was thus lost in the bolting, and if the sharps had been sifted, they would have afforded three pounds of good flour. We are inclined to think, from these and similar data, if the price of wheat were given, that of flour

might be easily ascertained, and those frauds which are now practised with impunity, could be effectually prevented.

[It has been stated by the London bakers when examined a few years since before the House of Commons, that the American flour went further in making bread than that of England. This is a proud fact for the American farmers, and cannot fail of being gratifying to every patriotic mind.]

Many valuable *substitutes for flour* have already been mentioned under the head of BREAD..... In this place, therefore, we shall only observe, that the most plentiful and the *cheapest* of these articles, in times of great scarcity, would doubtless be the CHESNUT (of which we have given an account in its alphabetical order).

FLOWER, or *Flos*, the most beautiful part of the plants and trees, which contains the organs of fructification. See BOTANY.

From their frequent utility as medicinal drugs, as well as their external beauty, the *preservation of flowers* becomes an object of some importance. For this purpose, various methods have been devised, from which we select the following, originally suggested by Sir JOHN HILL: Let a sufficient quantity of fine sand be washed, so as completely to separate all extraneous matter. It is next to be dried and sifted in order to cleanse it from the gross impurities that would not rise in washing. The flower or plant intended to be preserved, should then be gathered with a convenient portion of the stalk, and deposited in an earthen vessel adapted to its size. A small quantity of the sand, prepared as above directed, is next to be heated, and laid on the bottom of the vessel, so as to cover it equally, and the plant or flower placed on such sand, so as to touch no part of the vessel. More sand is then to be sifted over, that the leaves may gradually expand, without receiving any injury, till the plant or flower is covered to the depth of two inches. The vessel is now to be placed in a stove, or hot-house, heated by gradations to the 50th degree of REAUMUR, or about 144 deg. of FAHRENHEIT, where it should stand for one, two, or more days, in proportion to the thickness or succulence of such plant, or flower. At the end of that time, the sand may be gently shaken off on a sheet of paper, and the plant carefully taken out, when it will be found in all its beauty; its shape being as elegant, and its colours as vivid, as when it was growing in a natural state.

There are some flowers, especially tulips, which require certain little operations, in order to preserve the adherence of their petals. With respect to those, it will be necessary to cut the triangular fruit that rises in the middle of the flower, previously to covering it with sand; for the petal will then remain more firmly attached to the stalk.

This method may be applied to such plants and flowers as are employed in medicine: for, though it be not always necessary to preserve their original colour and form, yet the less change they undergo, the better will they retain their natural properties. Farther, the preservation of beautiful leaves and flowers in their original shape and colour, by placing them in such a situation that they may suffer no subsequent alteration, ex-

cept that from length of time or accident, is surely an object that merits the attention of every lover of Nature. See HERBAL.

Besides this mode of preserving flowers, they may be prepared so as to retain their beauty during the winter, and even to blow at any period required. In order to succeed in this attempt, the most perfect buds of the flowers, should be selected at the time when they are about to open. These should be cut off with a pair of scissars, leaving to each a piece of the stem about three inches in length; the end of which is immediately to be covered with Spanish wax. As soon as the buds are somewhat shrunk and wrinkled, they are to be folded up, separately, in a piece of clean dry paper, and deposited in a dry box or drawer, where they will keep without decaying. In the winter, or whenever the flowers are required to blow, the wax is to be cut off the buds, and these should in the evening be immersed into water, in which a little nitre, or common salt, has been dissolved: if exposed to the rays of the sun, on the succeeding day, they will expand with all their original fragrance and beauty.

There are a few general remarks made by eminent botanists, on the *growth*, *enlargement*, *colours*, and *duplication of flowers;* the substance of which we shall communicate under the following heads:

1. It is an established fact, that flowers as well as fruits grow larger in the shade, and ripen and decay soonest, when exposed to the sun. Hence, likewise, the foliage or buds of plants requires more moisture for its vigorous growth than their flowers, or organs of fructification. Farther, observes Dr. DARWIN, the frequent rains of our climate, are apt not only to wash off the farina from the bursting anthers, and thus to prevent the impregnation of the pistil, but also to delay the ripening of the fruit or seeds, from the want of a due evaporation of their perspirable matter, as well as from the deficiency of solar light in cloudy seasons. In another place of his admirable "*Phytologia*," this philosopher remarks that, as a superfluous supply of water is more friendly to the growth of leaf-buds, than to the generation of flower-buds, the production of seeds may be forwarded by supplying their roots with less water than usual. But when the blossoms appear, an addition of water promotes their growth, by affording nourishment, which should again be lessoned, when the fruit has acquired its full size, both to promote its maturity and improve its flavour; as the saccharine matter and essential oil will thus be in a less diluted state. Although the fruit may become sweeter and larger, when the green as well as the floral leaves continue on the tree, yet the corols with the stamens, stigmas, and nectaries (the succeeding fruit not considered) suffer, in the opinion of Dr. DARWIN, no injury when both kind of leaves are removed, by the depredations of insects. Nay, some florists assert, that the flowers thus become stronger, producing no bulbs, as is the case with tulips and hyacinths.

2d. The variegated *colours* of the petals of flowers are so beautiful, and afford such delight to the eye of the contemplative naturalist, as to deserve some investigation. It is probable that *varieties* in the colours of single flowers

raised from seeds, may be generally obtained by sowing those which already possess different shades, contiguous to others of the same species; or, by bending the flowers of one colour and shaking the anther-dust over those of another. Thus Dr. DARWIN supposes the buds of the corn blue-bottle, *centaurea cyanus*, acquire those beautiful shades of blue, purple, and white. As some animals change their natural colours, when transplanted in different situations of soil, a similar effect may be produced by sowing flowers in factitious composts, which considerably differ from each other with respect to vegetable nutriment, and perhaps also in their colour. Experiments on this subject, as well as on the variegation of the leaves of shrubs and trees, are however wanting to confirm this conjecture; though the latter probably originates from soil or situation, and may be communicated by ingrafting. The origin of *new* colours in flowers, and of variegated foliage, is imagined to arise from the want of nourishment of the soil on which they grow, compared to that assigned to them by Nature; or from a defect of moisture and of heat; a supposition countenanced by the dwarfish size of such plants, in general, and especially by the reduced stature of tulips, when their petals acquire various colours.

The immediate cause of the various colours presented by some flowers, such as poppies, has not hitherto been distinctly ascertained; but Dr. DARWIN conjectures that, as they are not variable by the obliquity with which they are seen, like those of mother-pearl, card-fish, &c. they do not depend on the thinness of their pellicle, and may, therefore, arise from the greater facility which some parts of vegetables, more than others, possess in parting with their *oxygen* (which see) when exposed to the sun's light; for all flowers are more or less blanched before they first open.

3. The origin of *double flowers* is believed to result from the luxuriant growth of the plant, in consequence of excessive nourishment, moisture, and warmth; they arise from the increase of some parts of the flower, and the consequent exclusion of others. As they present a greater blaze of colour in a small space, and continue in bloom for some weeks longer than single flowers, the method of producing them from seeds is a matter of importance. Botanists very properly term such multiplied flowers *vegetable monsters*, because they possess no stamens or pistils, and therefore can produce no seeds. Nevertheless they are frequently raised from seeds; because flowers cultivated with more manure, moisture, and warmth than is congenial to them, not only grow larger and more vigorously, but likewise shew a tendency to become double, by having one or two supernumerary petals in each flower, such as the stock July flower, cheiranthus, and anemone. It is still more remarkable, that this duplicature is communicated to those individual blossoms: hence florists tie a thread round such flowers, to mark them, and to collect their seeds separately, from which double or full flowers are said to be uniformly produced, if they be cultivated with additional manure, moisture, and warmth, as has been already observed. There subsists

a curious analogy, concludes Dr. Darwin, between these vegetable monsters and those of the animal world; for a duplicature of limbs frequently attends the latter, as chickens and turkeys with four legs and four wings, and calves with two heads. In mules, also, the most important organs become deficient, so that they cannot propagate their species; exactly analogous to these full flowers which, from the same cause, produce no seed. With respect to botanic systems, it may be observed from these vegetables of exuberant growth, that the stamens and pistils are less liable to change than the corals and nectaries; consequently, that they are more proper parts for arranging plants into classes; and that on this idea Linnæus constructed his unrivalled system. Lastly, the calyx, or perianth, being seldom found in a double or multiplied state, is the next part of a flower that is liable to the least changes; and may, therefore, on accurate inspection, serve to detect the genera of many double flowers.

With respect to the colours which may be extracted from flowers, we refer the reader to the article Colouring Matter, and to the different flowers as they occur in their alphabetical order.

FLOWER-DE-LUCE, or Flag, *Iris*, L. a genus of plants consisting of 54 species; the following three of which are natives of Britain:

1. The *pseudacorous*, Water Flower-de-luce, or Yellow Flag; which is perennial, grows on the banks of rivers, in marshes and wet meadows, and produces large yellow flowers in the month of July. The leaves of this plant, when fresh, are eaten by goats, and when in a dry state, by cows, but they are refused by horses and hogs.... On account of its poisonous nature to all cattle, except sheep, this vegetable ought to be carefully extirpated from the meadow-grounds, and their contiguous ditches. The juice of the fresh root is very acrid, and has been found to produce plentiful evacuations from the bowels, after other powerful remedies had failed: by continuing its use, it cured an obstinate dropsy. For this purpose, it has been taken in doses of 80 drops, every second or third hour; but the degree of its acrimony is so uncertain, that it can never be gradually used. With more advantage and safety we may recommend the whole of this strongly astringent plant to the *tanner*; and its flowers to the *dyer*, for extracting a beautiful yellow; but the root, in particular, as a substitute for galls in preparing a black dye, or ink, with vitriol of iron. Lastly, the roots of this species are stated to be an antidote to the bite of a mad-dog; and, after having been mixed with the food of some hogs that had been bitten, they escaped the disease, while others, injured by the same dog, died raving mad.

2. The *foetida*, Stinking Flower-de-luce, Gladwyn, or Flag, which is found on hedge-banks, and sloping grounds, particularly in the south-western counties of England: it is perennial, and produces flowers of a purplish ash-colour, which lose their smell during the night, and blow in the months of June and July. This plant is refused by horses, sheep, and goats; its leaves are very

fetid, and when bruised, smell like rancid bacon. The juice of the roots of this, as well as the preceding species, have occasionally been used to excite sneezing; which is a dangerous practice, and has sometimes been attended with violent convulsions. It may, therefore, be more usefully employed for the destruction of bugs and other vermin.

3. The *Xiphium*, or BULBOUS-ROOTED FLOWER-DE-LUCE or Flag, which has long been cultivated in our gardens, on account of its beauty. It has lately been found wild in the county of Worcester, and produces, generally, purplish-blue flowers. M. SCHULZE informs us in his "*Social Narratives*," (in German), that he made the following experiments with the azure-blue flowers of this neglected plant: He first bruised the flower-leaves in a marble mortar, expressed their juice, collected it in a shallow glass vessel, and, after adding a small portion of finely-pulverized alum, he suffered it to dry under shade, in the open air: thus, he obtained a very beautiful *green pigment*. The flowers, however, should be gathered in dry weather, their white parts carefully separated from the coloured leaves, and the pounded alum gradually mixed with the juice, till the desired colour becomes perceptible. With this preparation, both linen and silk were dyed of a remarkably fine and permanent green colour. Prof. GMELIN, in his German "*Technical Chemistry*," gives the following recipe for preparing a lively *green water-colour*: Take equal quantities of the expressed juice of the bulbous-rooted flag and rue, and add such a proportion of a strong solution of alum, as is required to produce the colour.

FLOWERING FERN: See OSMUND-ROYAL.

FLUELLIN, the SHARP-POINTED, or *Antirrhinum Elatine*, L. is an indigenous annual plant, growing in corn-field, and flowering from July to September. The expressed juice of this plant has been highly recommended as an aperient, resolvent, and vulnerary; which properties an infusion of it possesses, though in an inferior degree. An ointment is prepared from this juice, which was formerly in great repute as a remedy in leprous, scrophulous, and cancerous cases. It is at present employed only by empirics, both male and female, who pretend to cure with it cancers of every description.

FLUMMERY, a kind of jelly made of oatmeal, in the following manner: Steep three large tablespoonfuls of finely ground oatmeal for 24 hours in two quarts of pure water, then pour off the clear fluid, and replace it by three pints of fresh water; strain it through a fine hair sieve, add to it two spoonfuls of orange flower-water, and one of sugar; boil the whole to the consistence of a hasty pudding, stirring it continually while boiling, till it become perfectly smooth. This preparation affords a grateful and nutritive breakfast to persons liable to costiveness, in consequence of a sedentary life.

FLUTE, The GERMAN, a musical instrument of a well known construction.

Although playing the flute is on the Continent more generally practised than in Britain, yet we think it useful to observe, that this ex-

ercise is by no means compatible with either *young* or *weak* lungs. Indeed, all *wind-instruments* are in many respects objectionable, because, after blowing forcibly, a large portion of air is suddenly inhaled, and afterwards partially expelled from the lungs, so that they are by this debilitating action continually expanded and relaxed, in a manner very different from that which Nature pursues in the process of respiration....See farther WIND-INSTRUMENTS.

FLUX, a disorder to which sheep are subject, when those useful animals, after having been kept on too short an allowance, suddenly come to their full feed. It is also sometimes accasioned by their eating the Fetid Chamomile, or May-weed, *Anthemis cotula*, L..... This disease, however, is not attended with any dangerous consequences, and generally disappears in the course of a few days, especially in dry weather. But, if it continue longer than a week, some sweet and well dryed hay should be given them, and a decoction of clover flowers, with the addition of a little barley-meal ; and neither allowing them any salt, nor to feed upon saline plants near the coast, during their convalescent state.

FLUX, or SAP-FLOW, *Fluxus umbilicalis*, a disease frequently occurring in plants and trees, when the alburnum, or sap-wood, is wounded during the spring ; and which consists of a saccharine, mucilaginous fluid, resembling honey-dew. This affection occasions great trouble, especially when vines in hot-houses are pruned too late in the season; for the whole branch is liable to bleed to death, in consequence of the loss of the sap, which ought to supply the young buds with nutriment, and expand their foliage.

There are some perennial plants, such as the cow-parsley, or *Heracleum sphondylium*, L. the roots of which, if the stems be severely wounded, or entirely cut off, when they have attained a certain height, are liable to decay in consequence or this flux, or loss of the umbilical fluid......Hence Dr. DARWIN observes, it has been recommended to mow down, early in the spring, thistles, and such other noxious weeds as are troublesome, on account of their rapid increase ; because many of them will perish, and the rest will be considerably weakened by the great discharge of sap that flows from their wounds at that season.

With respect to *trees*, there is another period of sap-flow, that occurs when the new buds are forming, after Midsummer. It is therefore very injurious to wound trees at that period ; and, as their vegetation is thus endangered, different applications have been recommended by gardeners. Dr. DARWIN is of opinion, that a bit of sponge, if bound upon the end of the cut branch, or upon the wound, by means of some elastic bandage, will be the most certain remedy to save them ; or, a wire may be substituted for the sponge, if twisted so tightly round the end of the maimed branch, as to check the circulation of the juices, and consequently to destroy the part above the ligature.

FLY, or *Musca*, L. an order of insects divided into several genera, of which we shall notice only those species that are more immediately connected with agriculture and domestic economy.

1. The *Dolphin*, or *Bean-fly*.

2. The *Corn*, or *Hessian-fly*, a native of the Landgravate of Hesse, whence it has received its name. This insect is particularly destructive to wheat-corn, in which it deposits its eggs close to the ground, while growing....When the young vermin are hatched, they continue for some time in a worm-state, feeding on the tender part of the stalk, the growth of which is thus effectually checked. The Hessian-fly committed great depredations in the Eastern counties of England, several years since, and, in the year 1787, did incalculable damage in the provinces of Pennsylvania and Maryland, in America. The only efficacious remedy hitherto discovered, consists in facilitating the vigorous growth of the plants, by properly manuring and cultivating the soil; which practice, as it will admit of late sowing, will greatly retard their progress.

[Common opinion has ascribed the introduction of the Hessian-fly into America, to the troops from Hesse Cassel, which came over with the British troops, during the revolutionary war in the United States. But there is great reason to believe this opinion erroneous. Sir JOSEPH BANKS informs Dr. MITCHELL, that he has no reason to believe its existence in any part of Germany, Count GENANI of Ravenna has not mentioned the fly in his splendid work upon the diseases to which wheat is subject in its growing state, though fifty different insects are described.

Agreeably to the interesting observations of the late Hon. J. HAVENS of Long-Island, inserted in the 1st. vol. of the *Transactions of the Agricultural Society of New-York*, the maggot of the fly generally proves more destructive to wheat in the autumn of the year than in the spring; and before cold weather it is transformed into a chrysalis, in which state it is prepared to remain during the winter, and in the spring will again be transformed into a fly, which completes two generations of the insect in one year.

Mr. HAVENS says, the *bearded wheat* resists the fly most, though we know from the experience of Mr. COOPER, (below stated) and of others, that it is not always able to resist the sting of the fly.

As the fly is not to be found in any other state than that of chrysalis in the time of harvest, and it remains in that state in the stubble for some time afterwards, Mr. H. recommends to burn the *stubble of grain after the harvest*, and to turn the ground over with the plough soon after, every year for several years, and has little doubt of its proving an effectual mean of destroying the whole species; for the insect would not long be continued on rye, which may be sown much later than wheat without injury from the winter.

The following directions to avoid the ravages of the fly are by JUDGE PETERS, of Philadelphia:

"After a crop of oats cut this season, [1802.] I ploughed in the stubble. The shed oats vegetated, and threw up plants generally through the field, which I am dressing with compost and stirring in, preparatory to a crop of wheat. The fly is now plentifully impregnating the oat plants.

"I am satisfied of the efficacy of the practice of lightly sowing fallows with oats, that the fly may deposit its brood in the oat plants, before the wheat is sown, or when it is young. The oat plants,

continuing to increase even with the young wheat, which it overgrows, afford a more inviting, because a more prominent object to this destructive but stupid insect, which does not discriminate between one plant and another. I mention *oats*, because it is a cheap and quick growing grain; and may (in this stage of its growth) occupy the fallows with the least injury. I know by repeated and careful observations, that the fly has no instinctive predilection for any particular plant. They light on all plants and shrubs indiscriminately. Some afford a better shelter, and protect their progeny, while on others they perish. Some plants are injured by them, and others are unhurt: in the wheat they do the most injury. It being our staple, and among the most valuable of our products, their progress in mischief is the most observed.

"I have had frequent opportunities of being convinced of the utility of the plan I now advise. I saw, among other instances, a remarkably clean and fair crop of wheat cut by one of my neighbours, last year, saved by this method from the fly, which either injured or destroyed the crops of most others.

"*As my field will be in high order, and well manured, I intend to sow late.* I expect the oats will continue to produce plants, on which the successive flights of flies will exhaust themselves. The wheat plants may escape their ravages. I communicate this to invite other farmers to investigate the fact, and pursue a similar plan, by which many have informed me they have been much benefited; some in a greater degree than others.

"I recommend sowing none but the fairest and best grains for seed. These produce vigorous plants, most capable of resisting the injuries from the fly. I do not believe in the magical power ascribed to *steeps*. I use steeps occasionally, that I may skim off the light, and cure the infected grain. They give an impetus and vigour to the first shoots of the plant, and so far are beneficial. But the crop requires other supplies in its progress.... Steeps of various sorts have been recommended as *specifics* against the fly. But these are not exclusively to be depended on."

The following observations on this destructive insect, were communicated to the Editor, by Jos. Cooper, Esq. of New-Jersey, to whom this work is indebted for several important articles:

"I first heard, a few years since, of the fly being in some wheat of a neighbour sown with turnips, which induced me to examine some wheat growing among buckwheat that had been sown in wheat stubble, and found the insect in great plenty. This caused me to suspend sowing wheat that year until the latter part of September: the wheat thus late sown appeared promising through the winter, but in the following month of April I discovered many plants of a darker green, the blades shorter, and more in clusters than the others, and the middle blades dead, or in a declining state; and, on examination, I found all having the above appearances, abounding with the insect. I pulled up many such plants, and putting them in glasses, covered them with perforated paper. In two or three weeks the fly came out: I then went into the field where I discovered similar flies in great numbers, but the crop was still promising, although the plants which were

much filled with the insect early in the spring had perished: the promising appearance continued until the grain was nearly filled, when a great part of it fell, and the crop was nearly half lost. I observed some late plants that were green at harvest almost as full of the insect as a piece of tainted meat with fly-blows. Seeing none after the beginning of September, and the weather having been very dry, and a rain coming on near the middle of that month, I was tempted to sow most of my wheat as soon as possible. The consequence was, although I sowed the *yellow bearded wheat*, that a lot of five acres which produced three hundred bushels of shelled Indian corn the year before, produced but six bushels of wheat. This deficiency I attributed solely to the ravages of the flies. The same year I sowed a piece of land of inferior quality, with the same kind of wheat, but two weeks later, and about two hundred yards from the other, which produced a good crop, and apparently not injured by the fly.

In the same or following year a friend, who was attached to early sowing, had prepared a piece of excellent ground, manured it highly, and sowed it about the latter end of August, which, after making a promising appearance, was totally destroyed. In the beginning of October he sowed an adjoining lot with wheat, in which he had raised pumpkins; the grain came up well, and made a fine appearance after the first snow that covered the ground, which fell the latter end of October, but was totally destroyed before winter. These experiments convinced me that sowing winter grain early is a mean of raising a brood of flies to deposit their eggs in, and thereby destroy the late sown grain in its vicinity. I had been informed of both wheat and rye sown in the spring, having been greatly damaged by the fly, but not sowing these grains, had not witnessed the fact until about three or four years ago, when I sowed some wheat and barley from La Plata, in April, in good land, well prepared: both made a promising appearance until the ears began to shoot, when the insects appeared on both, and were so numerous, that the barley was greatly injured, and the wheat nearly all destroyed. At the same time I had a lot less than 30 feet distant in wheat of the early Virginia kind, which had been sown the last week in October: it produced an excellent crop, and I did not perceive a single plant injured by the fly. The La Plata barley and wheat were sown the next spring very early; the wheat being a later vegetable, was destroyed by the fly, but the barley came forward so fast as to be proof against it, and has been sown every spring since, at the same early period, without receiving the smallest injury from the fly.

I am convinced, from the above and other experiments, that if the farmers all through a neigbourhood would prevent as much as possible such grain as is nutritive to the Hessian fly from vegetating in the period between harvest and the latter end of September; have their land in a good state of cultivation, and sow about the beginning of October, or even later; and of the kind of grain which comes forward most rapidly in the spring, they would receive little injury from the wheat fly: and as the early Virginia wheat was produced from a plant selected by an observant farmer

from his other wheat, there is no doubt that other sorts of grain might be improved by a selection of such particular plants as ripen earliest and are superior in other respects."

In a conversation with the editor, Mr. C. urged strongly the importance of sowing the early Virginia wheat as late in the autumn as can be done with safety: but at the same time observed, that no advantage would be derived from the practice, unless all the farmers in a neighbourhood agreed to pursue the same plan; for if an adjoining field be sown early, the flies which have been living on the grain of that field, will after destroying it, deposit their eggs in the stalks of that which is late sown, and destroy it either in the autumn or succeeding spring.

The necessity of this general agreement among neighbours, upon a point equally interesting to all, being mentioned, affords an opportunity of enforcing the great advantages that would arise from a weekly or half monthly meeting of the farmers at a *private* house, or county town-house. At these meetings the general result of different modes of cultivating the same article, the success attending accidental or intended rotations of crops, and the means of guarding against destructive insects might be communicated; useful hints might be dropped in the course of conversation which others might improve, and *harmony greatly promoted*. A library might be kept at the place of meeting, and the township business also transacted.]

3. The *turnip-fly*, which not only infests turnips, but also cabbages, flax, and other useful vegetables. In order to prevent the depredations of this insect, it has been recommended to mix three pounds of turnip-seed with one ounce of flour of sulphur in a glazed earthen pot, which should be closely covered: after standing twenty-four hours, another ounce of sulphur should be added, and the same quantity after forty-eight hours, so as to employ three ounces of this powder to three pounds of the seed, carefully stirring the whole every time the vessel is opened, with a smooth piece of wood or ladle, that the seed may be thoroughly impregnated with the sulphur. It is then to be sown on an acre of ground, in the usual manner, where it will effectually keep off the insect till the third or fourth seeding-leaf is formed, which will acquire a bitterish taste, and thus be secured from the depredations of the fly. Another remedy is, to strew tobacco-dust over the land; and in some counties the seeds are steeped in soot and water for several hours previously to being sown, by which they acquire such a degree of bitterness, as to screen them completely against the ravages of this noxious insect.

There is a kind of fly which infests orchards, perforating the leaves of the trees, especially quinces; and which, though the foliage is afterwards renewed, occasions irreparable injury to the fruit. With a view to prevent these depredations, it has been recommended to mix a small quantity of diluted honey with some arsenic, which composition attracts the insects, and consequently destroys them. This remedy may, with due precaution, also be employed in houses where flies abound; and as flies are liable to

great thirst, if a weak solution of arsenic with a little sugar be placed on a plate, in windows or on chimney-pieces, they will drink it eagerly, and thus meet with almost immediate destruction.

As, however, arsenical remedies are liable to produce dangerous accidents, we shall communicate other means which are less hazardous, and equally efficacious, for exterminating flies. If a room be swarming with these noisome insects, the most easy mode of expelling them is, simply by fumigating the apartment with the dried leaves of the gourd (*Cucurbita*, L.) the smoke of which instantly expels them, if the window be opened, or suffocates them in a close room; but, in the latter case, no person should remain within doors, as these narcotic fumes are apt to occasion the head-ach. In situations where this expedient cannot be conveniently adopted, Professor TROMSDORF has furnished us with an excellent remedy, that neither endangers the lives of children, nor is attended with much expense or trouble. Take two drams of the extract of quassia, dissolve it in half a pint of boiling water, add a little syrup of sugar, and pour the mixture on plates: to this enticing food flies are extremely partial; and it is to them not less fatal than solutions of arsenic.

FLY-BLOWN, a term expressive of that corruption of flesh-meat, or any animal food, which is occasioned by flies depositing their eggs on its surface, where they are subsequently bred into maggots. In the warm days of summer, meat is very liable to be thus tainted and rendered unfit for use, especially if it be kept in a close and damp place, which is not sufficiently ventilated. The easiest method of preventing such damage, is that of suspending the joints in a *meat-safe*, or a wooden frame surrounded by close wires, so that the flies may be completely excluded, and the air still allowed to perflate the whole apparatus.... An open and cool situation, however, ought to be chosen for this repository. Those families which are not provided with this useful domestic contrivance, may occasionally preserve joints of meat for several days, even in summer, by wrapping them in clean linen cloths, previously moistened with good white-wine vinegar, placing them in an earthen pan, and changing the cloth once or twice a day in warm weather....See also FLESH-MEAT.

FLY, the CATCH, or CAMPION, *Silene*, L. a numerous genus of plants amounting to 63 species, eleven of which are indigenous. None of these have hitherto been employed to any other useful purpose than that of serving as pasturage for cattle. There is, however, one remarkable species of this plant, namely, the *nutans*, or NOTTINGHAM CATCH-FLY, that grows on dry or hilly pastures and walls, produces *root-leaves* on short leaf-stalks, forming a close turf; and bears white flowers in June or July, which are eagerly visited by bees, and might, therefore, be cultivated with advantage, in situations where these industrious creatures are reared.

FLY, the SPANISH, usually called by the plural name of *cantharides*, but properly speaking, is a chafer of a shining green colour, a blueish shade, and emitting an unpleasant narcotic odour. This insect is the *Meloe vesicatorius*, L.

which preys on the leaves of the common lilac, *Syringa vulgaris*, L. privet, *Ligustrum vulgare*, L. common ash, *Fraxinus excelsior*, L. and other trees, though it seldom appears in our climate. Having already stated various substitutes for this foreign drug, under the head of BLISTER, and cautioned the reader against its indiscriminate application, we shall only add, that the internal use of this medicine, even in very small doses, is extremely precarious, and ought, therefore, to be abandoned. Externally, the tincture of Spanish fly has often been employed with advantage as a *rubefacient*, by merely rubbing indolent swellings; or, the powder, as an ingredient in plasters, which ought, however, to contain but a very small portion of this powerful stimulant.

[Four species of meloe that blister are found in the United States. The first was brought into notice by Dr. ISAAC CHAPMAN, of Bucks county, Pennsylvania. The species described by Dr. CHAPHAM feeds chiefly upon the potatoe; another upon the *Clematis Crispa*, a third (*Meloe* Penns. Lin.) upon *prunella vulgaris*, or self-heal, and *ambrosia trifida*, or stick weed. The *meloe majalis* has not yet been used to blister, though the attention of physicians was some years since directed to it by Dr. SHOEPF. From frequent trials, the Editor is convinced that the powers of Doctor CHAPMAN's blistering fly are equal, if not superior, to those of Europe, See WHEAT.]

FLY-STRUCK, a disorder peculiar to sheep, which is occasioned by a fly that settles and deposits its eggs on them, and very materially injures the quality of the fleece.

In order to remove this malady, it has been recommended to cut off the wool, as far as it is infected, and to pour a few drops of the following mixture in a circle round the maggots, produced from the flies, to prevent their escape.... Dissolve half an ounce of corrosive sublimate in 2 quarts of rain-water, to which a gill ($\frac{1}{4}$ of a pint) of spirits of turpentine should be added. When this compound is poured on the back of the diseased animal, in the manner above directed, the shepherd ought to drop a little among the maggots, and rub them about with his finger: in consequence of which, they will be immediately destroyed. Another remedy, after clipping the wool, is to rub the parts infected with finely powdered lime, or wood-ashes, and afterwards to anoint them with currier's oil, which will heal the wounds, and secure the animals from being stricken again.

FOAL, or COLT and FILLY, the young of a horse. See COLT.

FODDER, denotes any kind of dry food provided for horses, or other cattle: it is more particularly applied to hay and straw.

Having already specified those vegetables which may be employed with the greatest advantage in the feeding of oxen, cows, bulls, &c. we shall here offer only a few observations supplementary to those stated under the article CATTLE.

The saving of expense in obtaining manure, is an object of great importance to farmers; but there are few, comparatively speaking, who pay a due regard to this circumstance; and, by disposing of their hard straw (such as that of barley, rye, &c.) for the purpose of thatching, they are under the necessity of purchasing dun

which expense might be completely obviated, by employing such straw in feeding their oxen, and other *dry* cattle.....See Straw-Cutter.

Considerable advantages might likewise be derived from the use of *compressed fodder*, invented by Mr. Lawson, of Rotherhithe-street, London. This consists of the haulms of peas, beans, potatoes, and the tops of carrots, which, after being cut off and dried, are mixed with certain portions of bruised corn, hay, fir-tops, bran, and broken oil-cake, and then formed into a stack, with clover, either in layers, or intermingled with that plant. To these articles, Mr. Lawson directs a quantity of straw to be added, in order to prevent the compressed food from becoming mouldy, together with a small portion of common salt, which will both preserve and improve the fodder. The saving that might arise from the use of such provender, Mr. Lawson estimates at not less than *one-eighth* part of the corn and herbage now consumed in racks, and given in an unbroken state, by which means the greater part of its most nutritious properties is, to many kinds of cattle, totally lost: whereas, by breaking the corn and other ingredients, no part can possibly remain in an undigested state, such as is frequently evident in horses fed with whole corn, which they void with their dung, being as perfect and entire, as when it was first taken from the bin. Facts, like these, require no farther exposition, and we earnestly recommend them to the attention of every intelligent farmer and grazier.

[Alternate layers of second crop clover newly cut, and straw stacked, have been found by a grazing friend, an excellent food. The superapundant moisture of the clover is absorbed by the straw, which thus impregnated is eaten greedily by cattle and horses, and the clover being dried, is prevented from heating.]

FOG, or Mist, a meteor consisting of gross vapours floating near the surface of the earth.

Fogs have a considerable influence on the winter. In the summer of 1783, an uncommon fog prevailed all over Europe, and great part of North America. It was dry, of a permanant nature, and the rays of the sun had but little effect in dissipating it, which they easily do in moist fogs arising from water. The effect of the rays in heating the earth was exceedingly diminished: hence its surface was frozen early, the first snows remained on it undissolved, and received continual additions; the air was more chilled, and intensely cold, and the winter of 1783 and 1784 was exceedingly severe.

The spring fogs are most detrimental to such young fruit, and other trees, as are planted in low situations; because they moisten the young shoots, and thus render them more liable to the injuries of the frosty nights succeeding them, but which they escape when placed in more elevated situations. These fogs are converted into rime during the night, which thus falls on the trees, and is in some circumstances believed to shelter the vegetables by the heat it emits at the moment of its freezing: hence *black frosts*, which are not accompanied with rime, are said to be more prejudicial. But Dr. Darwin remarks, that where dew or

mist descends on vegetables, before the act of freezing commences, and is partly absorbed by them, they become more succulent, and are thus destroyed by their fluids being converted into ice. To obviate this inconvenience, he proposes to make temporary sheds in the walls of gardens, projecting eight inches from the walls, and to be held by hooks that may be easily removed, when no more frosts are to be apprehended. Dr. DARWIN succesfully tried this expedient with an apricot-tree, which was preserved uninjured, either by the fog, or the frosts that followed it, during the vernal nights.

FOMENTATION, in the healing art, signifies the external application of a fluid in cases of swellings, &c. as warm as the patient can bear it, and in the following manner: Two pieces of flannel are dipt into the heated liquor, one of which is expeditiously wrung dry, and thus immediately applied to the part affected. As soon as it begins to grow cool, the first is removed, and the other instantly substituted, in order to keep those parts constantly supplied with the warm flannels. This operation is continued for 15 or 20 minutes, and is repeated two or three times in the course of the day, as circumstances may require.

The design of fomentations may be fully answered, by the application of warm water alone, unless discutients or antiseptics are required; in which cases, such ingredients must be employed as are calculated to effect that purpose.

The degree of heat should on no account exceed that of producing an agreeable sensation; for too great heat is attended with effects, very different from those which are expected from the use of fomentations.

FOOD, generally speaking, denotes those alimentary substances which are taken into the stomach, whether fluid or solid, but it is usually confined to the latter kind: ....of the former we have already spoken in the article DRINK.

In the early ages of the world, mankind were supported by acorns, berries, wild roots, and such other vegetables as the earth spontaneously produces. In succeeding centuries, as civilization advanced, luxury also made rapid progress; men had recourse to animals, as well as to vegetables artificially raised for their sustenance; and, in still later ages, the art of preparing food has been brought perhaps to the highest degree of perfection, of which it is susceptible.

Though originally designed to be a blessing to mankind, as well as their support, food may, in many cases, be justly considered as a curse: for we do not hesitate to affirm, that the injudicious conduct of parents and nurses, during infancy, and the early years of childhood, lays the foundation of those numerous diseases, which, at a maturer age arise from indigestion, and have, in many families, become hereditary.

The aliment of children ought to be adapted to their age, and the strength of their digestive powers. Hence they ought by no means to be fed immoderately, and promiscuously, with every kind of food: as, by this indulgence, the first passages are distended, and their stomachs gradually acquire an unnatural craving for victuals, before the preceding meal is proper-

ly assimilated. Such conduct is particularly injurious during the first year of their age: for, when their stomachs become more vigorous, they may be enabled, by slow degrees, to digest different kinds of victuals, the nature and properties of which are extremely opposite; though excess in quantity is always hurtful. No food whatever, that has been prepared for many hours, should be given to children, especially after being *warmed up*, as it generates flatulence, heart-burn, costiveness, and a variety of disorders which are equally painful and difficult to remove. Sudden changes from liquid to solid food are equally dangerous: one kind of aliment only, should be given at each meal, in moderate portions; and not a multiplicity of incongruous mixtures, in immediate succession, such as broth or soup, meat boiled or roasted, after taking milk, fruit, &c.

All stimulating dishes, prepared for adults, as well as beer, wine, spices, coffee, and other heating liquors, should be carefully withheld from children; as they often occasion the most afflictive complaints, for instance, eructations, vomiting, spasms, and convulsions, especially during dentition; and, if the hapless victims of indulgence survive that period, they become liable to other tormenting diseases, the most frequent of which are the scurvy, scrophula, and consumption.

There is another abuse in the feeding of children, which cannot be too seriously reprehended, namely, to introduce chewed victuals into their mouth, a practice equally disgusting and unwholesme.... Young and healthy mothers, it has been said, may safely perform this office for their children: but, in such case, it is requisite that the parent be in a complete state of health, that she be provided with sound teeth, and rinse her mouth previously with pure water. Under these circumstances, she may venture to perform mastication, though it would be more advisable to relinquish this practice, and to give infants such food only as they are able to chew and digest.

Having already treated on the food of adults, under the article Diet, and on different modes of preparing it, under that of Cooking, we have but a few remarks to add for the information of the reader.

Vegetables are, with a few exceptions, more difficult of digestion than *animal food*; but a due proportion of both, with the addition of acids, during the summer months, is alike grateful and conducive to health. On the whole, the flesh of young quadrupeds is less nutritive than after they have attained a proper age; though it will, in general, be more easily converted into alimentary matter. In a *salted* state, meat not only loses a considerable part of its gelatinous and spirituous particles, but it likewise becomes oppressive to the digestive organ, and imparts a degree of acrimony to the human fluids, which has a remarkable tendency to generate putrid diseases, such as the scurvy of mariners....Hence it would be a desirable object to ascertain, by accurate experiments, whether beef, pork, &c. might not be kept fresh at sea for many months, merely by burying it in charcoal-powder, of which it could be easily divested by proper ablution. Such is our decided opinion, and

we venture to recommend this important subject to the farther researches of patriotic inquirers.

With respect to the quantity of food, there is one general rule, which ought never to be disregarded; namely, to cease eating, when the first cravings of appetite are satisfied, so as to renovate the waste which the body has apparently sustained. By a strict adherence to this principle, many of those distressing complaints arising from intemperance, might be effectually obviated; and our fashionable *watering places* would not be so frequently crowded by the victims of luxury.

FOOD OF PLANTS, an expression in agriculture and gardening, by which is understood whatever tends to increase the growth, or affords nourishment to vegetable productions.

The proper choice and distribution of this food, in such manner as to ensure the greatest advantage to vegetation, is an object deserving the most attentive exertion of every skilful husbandman. The component parts of the nourishment of plants are supposed to be *air*, *heat*, *water*, *earth*, *and nitre;* but it is by no means ascertained, which of these ingredients principally contributes to their growth and reproduction.

Various opinions have been held respecting the existence of an *aerial acid spirit;* but, from the late discoveries in chemistry, this invisible agent appears to be no other than what is now termed *oxygen gas*, or the acidifying principle, by the powerful influence of which even iron is oxydated, or converted into rust: and, as this vital gas is an essential constituent of the atmosphere, all plants necessarily partake of its animating properties. Thus *nitre* is said to nourish them; because it contains a large portion of oxygen; though it is certain that saltpetre only prepares other substances to effect that purpose: thus, if nitre, in a solid or liquid state, be applied to the root of a plant, it will destroy it; but if it be placed at a distance, it attenuates, and decomposes the viscous and naturally pernicious matters contained in the earth, so as to render them fit for supplying vegetables with nutriment.

Water contributes to the growth of plants in a very material degree: hence arose the art of floating land in dry seasons, without which vegetables would perish for want of moisture. See IRRIGATION.

Air, on account of its elasticity, is absolutely necessary to the increment of vegetables; *warmth* is of equal importance, because no plant can thrive without some degree of heat. But, doubtless, the chief article is *earth;* which, being prepared by the nitrous, and other volatile salts, such as are generated in dung, not less than by water and air, is assimilated to the nature of plants; constitutes a part of them; and is inseparable from them: but, if water, air, and heat, be taken away, the plant will still exist; though, from the want of those elements, it has ceased to vegetate.

The excess of nitre, air, water, and heat, however, is a proof that these articles do not constitue the proper or only food of plants.... Thus, too great a proportion of nitre, or other salts, corrodes, and deprives them of vegetable life; too much water drowns them; too great a degree of air dries their roots; and too much heat shrivels and burns them; but there cannot

be too large a proportion of *earth*, unless the plant be too deeply buried under it, so as to exclude the salutary influence of the other elements; in which case it must necessarily perish.

Many experiments have lately been made with factitious gases, in order to ascertain whether the growth of plants might be forwarded by such artificial agents; but, though some of these elastic airs, such as oxygen, have been found remarkably to promote vegetation, yet the expense and trouble, which these applications would occasion in the great way, will ever be insuperable objections to their general introduction. From recent attempts to fertilize and stimulate the soil itself, as the growing medium, with chemical solutions, it appears that water very slightly impregnated with *camphor*, or, according to others, with the *phosphoric acid*, (which see), has produced uncommon effects on the earth of vegetables, and accelerated their rapid growth in a very evident manner. Farther experiments, however, will decide how far such means are practicable, and whether the nature of plants thus forced, is materially changed or affected.

In a select collection of "*Memoirs*," lately published by the *Free Society of Agriculture, Arts and Commerce*, in the Department of Ardenne, the following vegetative liquor is recommended for promoting the growth, as well as the flowering, of bulbous roots in apartments, during the winter: Take 3 oz. of nitre; 1 oz. of sea-salt; half an oz. of salt of tartar; half an oz. of sugar; and one pint of rain water. Let the salts be gradually dissolved in a glazed earthen vessel; and, when the solution is completed, add the sugar, and filter the whole. About eight drops of this liquid must be poured into every flower-glass filled with rain or river water: these vessels should be kept constantly full, and the water be renewed every tenth or twelfth day; a similar portion of the vegetative liquor being added each time. In order to ensure success, the glasses ought to be placed on the corner of a chimney-piece, where a fire is regularly kept in cold seasons.

FOOLS'-PARSLEY, or LESSER HEMLOCK, *Aethusa cynapium*, L. an indigenous plant, growing in corn-fields and kitchen-gardens, and flowering in the months of August and September.

This noxious weed greatly resembles the common parsley, for which it is sometimes mistaken; but may be easily distinguished by its glossy surface, and total want of odour: when eaten among other plants, it occasions vomiting, violent colic, and other painful symptoms.....Such accidents, however, might be easily avoided, by cultivating only the curled-leaved parsley, *Apium graveolens*, L. in our gardens. The fool's-parsley is eaten by horses, cows, sheep, and goats; but is pernicious to sheep.

FOOT, that part of the body on which animals stand and walk.

The principal cause of the lameness and distortion observable among many children, especially of the poorer class, is owing to an improper management of them, during their infancy. Instead of being carried on their nurses' arms, in a posture which contracts and palsies the lower extremities, they ought to be supported in such a direction that the legs and feet may

be at liberty. Nor should they be confined too early in narrow shoes, with a view to render their feet small and *taper:* those necessary parts of our dress ought to be wide enough to allow sufficient room for motion, and might be fastened with strings, which are preferable to buckles. It will also be proper to adapt the shoes to the form of each foot, by means of separate lasts; in the same manner as those of the fashionable classes are made at present. A kind of half-boots, however, such as may be laced above the ancles, are superior to shoes, as they not only have the advantage of fitting the leg, but are likewise not easily trodden down at the heels; besides, children are enabled to walk more firmly in them than in shoes.

With respect to the feet of adults, we would recommend always to adapt the shoe to their size and shape, and utterly to disregard the prevalence of an absurd fashion, which is often attended with inconvenience. Hence arise those painful excrescences, *corns*, concerning the cure of which we have already treated. To the same cause must be ascribed the growing of the nails into the flesh, which is attended with excruciating pains.

Bathing the feet and legs, over the knees, in warm water, is of great service, especially after returning from a long journey..... When employed as an assistant to medicine, in certain diseases, it is of considerable advantage: and, if it be of a proper temperature, not exceeding 98°, it may be considered as a safe cordial, by which the circulation of the fluids can be excited, or a gentle and salutary fever induced. Bathing of the feet, therefore, is incomparably safer than the generality of cordials and sudorifics, as its effects may be suspended at pleasure.

Blistered feet, or vesicles containing water, may be prevented in the hot days of summer, by anointing the soles of the feet with venison tallow, and wearing worsted socks. We know an instance of a man, who at the age of eighty years travelled on foot, in warm weather, from the vicinity of Durham to the west of Scotland, a distance of 200 miles, in five days, without experiencing any inconvenience: on inquiry, he declared that he made use of no other expedient than that of rubbing the feet of clean woollen stockings, every evening, with spirit or oil of turpentine; suffering the moisture to evaporate during the night, and wearing them on the following day. We believe, however, that *vitriolic æther*, though more expensive, would be better adapted to the purpose. But, when the feet are once blistered, it is advisable to open the vesicles without delay, by the point of a lancet, or needle; to express the water; and rub the parts with the fat of venison, or mutton-suet taken from the kidneys.

Those parents whose children are afflicted with club feet, or other deformities of the lower parts, we would recommend to peruse Mr. SHELDRAKE's "*Practical Essay on the Club-foot*," &c. (8vo. p. 214. 7*s.* MURRAY and Co. 1798); where they will find much information perspicuously arranged, and illustrated by engravings....See CHILBLAIN and SHOE.

[The many melancholy instances of persons walking with inverted feet, which we daily see, cannot fail of causing regret among medi-

cal men in particular, from the circumstance of their knowing with what ease many of those cases might have been relieved by an early attention. In England great attention has been paid to cases of malconformation of the feet, and few cases are said to occur in which much of the deformity cannot be removed; but trials ought to be made before the age of two years. Mr. Bishop, of Philadelphia, and Mr. Watt, of Paisley, in Scotland, have taken the lead in these complaints. A plate of Mr. Watt's machines may be seen in the *Medical and Physical Journal of London*, vol. 4.]

FOOT-HALT, a disorder peculiar to sheep, and which is occasioned by an insect resembling a worm, two, three, and sometimes four inches in length. The first appearance of this malady is manifest by the lameness of the animal, a symptom which increases to so high a degree, as to prevent it from grazing. In consequence of pain, and want of food, the sheep lingers till at length it falls a victim to the disease, unless the worm be timely extracted; an operation that may be easily performed.

As soon as the animal begins to limp, the lame foot should be examined between the close of the claws, where the skin will be found perforated with a hole, through which the insect has worked itself a passage upwards, between the external membranes and the bone. In order to extract the worm, the claws should be moved in contrary directions, for a considerable time, till the insect gradually makes its way to the surface. This simple operation will be fully efficient, without any other application; and it is certainly preferable to drawing the worm out; as in the latter case there is always danger of its breaking off, and rotting in the sheep's leg, which would materially injure the animal.

The *foot-halt* occurs more frequently in wet than in dry seasons; generally in the spring and autumn, but seldom in the summer and winter. Sheep that are pastured in high, healthy grounds, are less liable to be attacked by this insect, than those which graze in low meadows, or marshy soils.

FOOT-ROT, a disease to which sheep are subject, and which is said to be contagious.

The first symptom of the disorder is manifest, when the animal affected begins to limp; though no injury will be perceptible on examining the foot, which is extremely hot.

The second stage of the distemper is a yellowish-white spot, that appears in the cleft of the hoof, spreads gradually, and becomes livid; destroying the hair, which in sound animals covers the foot. At this period, the diseased part acquires a disagreeable smell, and the lameness increases.

In the third stage, the malady sinks into the frog of the foot; the shell of the hoof loosens, and the frog is filled with fetid matter, that oozes out when pressed by the hand: a small tumour sometimes breaks out in the front of the leg, about one inch above the hoof, which, however, is easily dispersed.

In the last stage, the foot is so completely mortified by the cancerous humour corroding every part of it, as to become incurable; in which case, the skin is the only valuable part of the animal.

Through these different periods,

the sheep affected retain their appetite, and feed apparently as well as when in health; but they very soon fall away, and continue to decline, till they have lost all their fat. Notwithstanding their rapid decay, at the end of the second and the commencement of the third stage, they are so eager for food, that they even crawl on their knees for sustenance.

For the cure of this infectious disorder, different remedies have been prescribed; from which we select the following: the first was invented by the late Mr. Bakewell, the other by Mr. George Culley of Fenton, Northumberland.

1. Take 3 oz. of verdigrease; of vitriol, and common alum, 4 oz. each; white mercury 1 $\frac{1}{2}$ oz. and white copperas 1 oz. The whole is to be finely pulverized, and dissolved in a quart of white wine vinegar.

2. Let 4 oz. of the best honey; 2 oz. of burnt alum, reduced to powder, and $\frac{1}{2}$ lb. of pulverized Armenian bole, be mixed in as much train or fish oil as will convert these ingredients into the consistence of salve: the honey ought first to be gradually dissolved, when the Armenian bole should be properly stirred in, after which the alum and train oil are to be added.

The parts affected may be rubbed with either of these compositions; unless the distemper has become incurable; but in the opinion of Mr. Arthur Young (from the 21st vol. of whose *Annals* we have abstracted these recipes), the *red salve* of Mr. Culley, is more efficacious than Mr. Bakewell's liquid, having cured one or two diseased feet, where the latter had failed: yet Mr. Y. always employs the liquid previous to anointing the animals with the salve.

This malady, in general, arises from long grass in wet seasons, but, if sheep be suffered to lie upon their own dung, a fermentation will take place, and occasion either the *foot-rot*, or the *foot-halt:* to prevent which fatal disorders, those animals should be well littered, and kept with a strict attention to cleanliness.

[This disease was mentioned under the article Cattle.]

FORCING, in horticulture, is the art of producing ripe fruits from trees, before their natural season.

Although by no means inclined to encourage this artificial practice, as fruit thus raised is neither savoury nor wholesome, yet we shall insert the method generally adopted to effect that purpose, for the gratification of the curious, more than for its real utility.

A wall should be erected ten feet in height; a border marked out on its south side, about four feet wide; and stakes fastened into the ground along the edge of the border, at the distance of four inches. These are intended for the support of the glass lights (or, with less expense, frames covered with oiled paper), which are to be placed in a sloping direction towards the wall, to shelter the fruit, as occasion may require: at each end, a door is to be so constructed that it may be opened either way, according to the course of the wind. The frame ought to be moveable; because after a tree has been covered one year, the former should be removed to another, observing that each fruit-tree be forced only once

in three years: by this arrangement, they will be more durable and productive.

Previously to applying the dung to the wall, it should be thrown together in a heap, for five or six days, that it may thoroughly ferment; thus prepared, it ought to be laid four feet thick at the base of the wall; and continued upwards in a sloping direction, till it is about two feet in thickness, within a few inches from the top of the wall; but, as it sinks, more dung should be added, for the first heat will only swell the blossom-buds. The proper season for laying it, is about the latter end of November; and, for ripening cherries, three changes of dung will be sufficient to produce very fine fruit in the month of February. This method of forcing, however, being often very expensive and troublesome, *tanner's waste* is now almost universally employed for producing artificial heat, by enclosing it to the depth of three or four feet, within the walls of a hot-house.

Early and late ripening fruits should never be placed together; because the requisite degree of heat for forcing the latter, would be very prejudicial to the former, after they have produced fruit. Glass, or oiled paper frames, are of considerable service for covering trees; but they should occasionally be removed to admit the benefit of gentle showers; and the doors at the ends may, in warm weather, either be left entirely open, or one of them only closed. A mat should be suspended before the doors, to protect the trees from night frosts.

The fruit-trees most proper for this management are, the avant, or small white nutmeg, the Albemarle, the early Newington, and the brown nutmeg-peaches; Mr. FAIRCHILD's early, the elrugo, and Newington nectarines; the masculine apricot; and the May-duke and May-cherry. With respect to vines, the white and black sweet-water grapes will thrive most favourably: for early gooseberries, the Dutch white, the Dutch early green, and the walnut gooseberry, are the best sorts; and for currants, the large Dutch white, as well as the red currants are equally prosperous....See HOT-HOUSES.

FORCING of *Wine*. See CLARIFICATION.

FOREST, generally speaking, signifies a large tract of land, covered with trees.

The principal forests in this country are those of Sherwood, Windsor, the New Forest, that of Dean, on the north of the river Severn, and Epping-forest, in the county of Essex. There are, besides, several smaller forests, the total extent of which, together with those just enumerated, amounts to about 300,000 acres..... The utility of forests, to a commercial nation, is very great; as, by the quantity of timber they afford, a considerable expense may be saved, which must otherwise be incurred by the importation of materials for ship-building.

Independently of these considerations, forests of a moderate extent are a national ornament, especially if they do not occupy such lands as could be more usefully employed in agriculture. Formerly, England abounded with woods, and was celebrated for its lofty and majestic oak, which, however, of late years has become scarce. On the contrary, various large tracts of uncultivated ground

might now be advantageously planted with larch fir, and other trees; but as these expensive undertakings are beyond the ability of private individuals, it is to be hoped that the commissioners of the Land Revenue will be able speedily to carry so patriotic a measure into effect....See PLANTATION.

FORE-STALLING is the buying of, or bargaining for, corn, cattle, or other merchandize, in its passage to fairs, or markets, for sale, with an intent to dispose of them again at an advanced price.

The punishment for this offence, on conviction by two or more witnesses, is, for the *first* time, two months imprisonment, and forfeiture of the goods, or their value; for the *second*, the offender incurs an imprisonment of six months, and loses double the value of the articles; and, for the third offence, he is liable to imprisonment during the King's pleasure; to a forfeiture of all his property; and is to be sentenced to stand in the pillory.

Severe, however, as these regulations appear, they have hitherto not been attended with the desired effect. Notwithstanding all the arguments and invectives that have been employed against this growing evil, in printed works, and in the courts of justice, we are persuaded that it will never be crushed, till national councils adopt proper and effectual measures for *preventing* this iniquitous practice. Nay, others assert, that the root of the mischief is intimately connected with the *landed interest*, as well as with the numerous *paper banks* which infest both town and country.

Such of our readers as have leisure, or inclination, to peruse a few late tracts on this important subject, we shall refer to Mr. GIRDLER's "*Observations on the pernicious consequences of Regrating, Forestalling, and Ingrossing, &c.* (8vo. 6s. Seeley, 1800,) where they will find considerable information, blended with reflections animated by benevolence and public spirit. It is but justice to observe, that the same author has published an abridgement of his work in 12mo. price 2s....Mr. MORRIS's "*Short Inquiry into the Nature of Monopoly and Forestalling*," (8vo. 1s. Cadell 1800,) contains a temperate discussion of this interesting topic.... To these we shall add Mr. ILLINGWORTH's "*Inquiry into the Laws, ancient and modern, respecting Forestalling, Regrating, and Ingrossing*," &c. (8vo. 7s. Brooke, 1800.) which comprehends a full investigation of the subject, according to the laws of this country; and is alike calculated to inform the lawyer, the antiquary, and those who are in search of truth.

FOSSIL-ALKALI, is thus called to distinguish it from the *vegetable alkali;* as the former is found in a pure state, in the bowels of the earth; whereas the latter is prepared from various plants.

Fossil, or mineral, alkali abounds chiefly in Egypt, Tripoli in Barbary, Hungary, several Russian Provinces, and some parts of Asia; but it has seldom been found in the western countries of Europe, except in the vicinity of volcanoes, or in mineral waters; and in these it exists only in very small portions.

The chief source of this alkali is the water of the ocean. It forms the basis of sea-salt; and, as it is an article of the greatest utility,

different methods of extracting it have lately been invented.

In August, 1781, a patent was granted to Mr. ALEX. FORDYCE, for his new processes, by which the alkali contained in sea-salt, rock-salt, salt springs, salt-cake, Glauber's-salt, and vitriolated tartar, may be separated from the marine or vitriolic acids....He first converts salt-water, &c. into Glauber's-salt, by the application of vitriolic acid, or of any substance containing the latter. This salt is then to be mixed with a double quantity of lime, chalk, or any other calcareous earth, or iron, or with any substance containing that metal. The whole is to be placed together in a vault, or other reservoir, secured from the rain, till it is completely decomposed, when the alkali is to be extracted by dissolving it in water, and evaporating it to dryness. Or the patentee employs 60lbs. of Glauber's-salt, or vitriolated tartar; 10lbs. of charcoal, or ny other substance capable of bearing heat, and containing the inflammable principle; and 10lbs. of iron: these ingredients are pounded together, and thrown into forty gallons of water; where they are suffered to digest for twenty-four hours. The clear solution is then to be separated; and, by evaporating, filtering, and crystalizing it is rendered fit for use.

Another patent was granted in March, 1789, to Mr. ANTHONY BOURBOULON de BONEUIL, of Liverpool, for his invention of an apparatus on a new construction, and certain new processes for the making of fossil alkali, which is said to be equal to that extracted from the best barilla....As, however, his specification is so complex, that it could not be understood without the aid of an engraving; and, as the patent is not expired, we refer the reader to the 4th vol. of the "*Repertory of Arts and Manufactures.*

The last process which merits our attention, is that of the Earl of DUNDONALD, for obtaining mineral or fossil, and vegetable alkali, from neutral salts composed of those alkalies and an acid; or from the solutions of those salts, whence several articles are disengaged or formed, that may be collected and applied to various useful purposes. For these different inventions, his Lordship obtained a patent in 1795.

1. The most important of the new processes, is that of making Glauber's-salt, or sulphat of soda, which is one of those neutral salts, consisting of an alkali and an acid, from which an alkaline salt is to be procured. Thus, several other articles, such as spirit of salt, sal ammoniac, and an iron earth mixed with clay, as a pigment, are formed, or disengaged, and may be collected: 2. Glauber's salt is decomposed, forming mineral alkali, or *soda*, either in a mild or caustic state: 3. Vitriolated tartar is prepared by decomposing the muriat of pot-ash; and 4. This preparation is converted into either a vegetable alkaline hepar, or mild or caustic vegetable alkali. The salts and other substances resulting from these chemical operations, may be applied to various purposes, particularly for decomposing soda from Glauber's-salt.

As the principal article for which Lord DUNDONALD has established manufactories, appears to be the SODA now generally sold in the shops, we shall, in the alphabetical series, describe its manifold uses,

and content ourselves at present with giving a summary of the inventions claimed by the noble patentee: namely, that sea-salt is decomposed by alum, by vitriol of iron, and Epsom-salt, with the aid of heat, when a due proportion of clay, or a clayey iron earth is mixed with the salts submitted to the operation;....that sea-salt is also decomposed by Epsom-salt with the aid of heat, and without the intervention of clay;....lastly, that it may likewise be reduced by sulphat of lime, or gypsum, with the aid of heat, when a due proportion of clay, containing much iron, is mixed with the sea-salt and gypsum.

FOSSIL-COAL, a species of pit-coal found in various parts of England....See COAL.

In December 1792, a patent was granted to Mr. JOHN BARBER, of Attleborough, Warwickshire, for a method of smelting and purifying fossil-coal, iron-stone, iron ore, &c. by steam, air, and fire, and for impregnating the same with inflammable air, by which he produced a tough metal.

The patentee directs any portion of iron-stone, or ore, together with a quantity of fossil-coal, to be put into a furnace, into which fire is to be admitted, and steam conveyed from a boiler, by means of pipes, through an aperture made in the hearth. These pipes are not to project into the furnace, but only to extend so far as to permit the steam to convey along with it a quantity of atmospheric air; and thus a calx sufficiently pure will be produced. The process of purification may be facilitated, by placing a vessel of water at the bottom of the furnace or building, for the reception of the hot calx while it falls, or is disengaged. And if sometimes a proper proportion of sal ammoniac, or other menstruum, be thrown in among the coals, &c. while purifying, that operation will be, in a considerable degree, facilitated.

When the calces are thus prepared, a portion of them, and also a quantity of fossil-coal, or purified coals, are to be put into a smelting furnace, beneath which a fire is to be kindled. Apertures are also to be made for the introduction of inflammable air, from one or more retorts, by means of pipes, either singly or conjointly with *air-blast*. Limestone, charcoal, and other substances abounding with inflammable air, may be added in due proportions, and will have an effect similar to that produced by the inflammable air alone, for which it may be occasionally substituted. The patentee observes, that the proportionate quantities of the various materials employed, can only be ascertained by experience; and the result of this process will be the production of a tough metal, capable of being applied to several useful purposes.

FOSSIL-PITCH, or HARDENED ROCK-OIL, *Petroleum induratum;* a bituminous production (see BITUMENS,) which consists of two varieties.

1. The *Asphaltum*, or pure fossil-pitch, which is found in the shores of the Dead and Red Seas; and in various parts of Europe. It is a hard, smooth, brittle substance, destitute of smell, and externally of a black or brown colour, but when exposed to the rays of light, appears of a deep red....It is chiefly used by watch-dial makers, who mix it with lamp-black, and oil of turpentine. The preparation of

this compound is said to be kept secret by certain persons at Strasburgh, in Alsatia.

2. The *Pix montana impura*, or *Pisasphaltum*, which is found in Sweden, Italy, and other parts of Europe. It coheres like slag, or the dregs of iron, and is of the colour of black-lead; but if subjected to strong heat, it is soon volatilized; and if left in the retort, a liquid substance distils into the receiver, resembling rock oil....This mineral oil is never used in England as a medicine; but in France the common people give it in drops for hysteric complaints, and also to their children, with a view to expel worms.

FOUL, a disorder in cattle, which proceeds from a peculiar state of the blood, and a watery rheum that descends into the legs, and occasions swellings. To remove this malady, it has been advised to throw the diseased quadruped on its back, and to tie its legs together, when the skin is to be slit with a sharp knife, in a straight direction above the heel. After this operation, a plaster consisting of nettles, garlic, and salt, should be applied to the wound, for a day or two: thus, it is said, the animal will be effectually recovered.

The appellation *foul*, is also given to a swelling between the clefts, or claws of cloven-footed cattle: it is produced by a worm, and gradually increases till it breaks, at the same time causing the affected creature to halt. To expedite the cure of this complaint, the tumour is directed to be lanced, before it is thoroughly ripe, and as soon as the matter is discharged, the wound should be anointed with a mixture of tar and grease. By these applications, together with keeping the feet clean, the disorder may be easily removed....We confess, however, we have had no experience in either cases of this veterinary practice.

FOUNDERED, a disease in the feet, to which horses are subject. It is occasioned by hard riding, severe labour, great heats, sudden colds, &c. that inflame the blood, and, as the farriers express it, *melt the grease*, which descends into the feet; where it settles and causes such a numbness and pricking in the hoof, as in some instances to render the animal affected unable to stand.

The general methods of removing this disorder are, first bleeding, which operation, if opportunely performed, is calculated to afford immediate relief....The rapid and irregular circulation of the blood, is then to be diminished, by giving the horse cooling salts internally, clysters, an opening diet, and plenty of diluting liquor four or five times every day, together with emollient poultices; which ought to be applied warm round the hoofs, in order to soften them, and to promote a free and equal perspiration.

But the sole or frog of the foot affected, should on no pretence be pared to that excess, which is too frequently done by ignorant farriers. It will be sufficient to clear away the hardened surface of the sole, that the poultice may properly open the pores. All greasy and oily applications should likewise be avoided, being ill calculated to accelerate the cure.

FOWL: See POULTRY.

FOWL-GRASS. See Roughish MEADOW-GRASS.

FOX, or *Canis vulpis*, L. an animal of the canine race, well known for his cunning, and the depredations he commits in farm-yards among poultry, and in warrens among rabbits.

Foxes produce but once a year, and the litter generally consists of four or five, but seldom six or eight, and never less than three. The time of gestation is in the winter, and young cubs are found in the month of April. These, like dogs, are brought forth blind; they continue to grow fifteen months or longer, and live to the age of fourteen years.

It is remarkable, that on its long hairy tail the fox has a small bunch of hair which emits an agreeable odour, not unlike that of violets: this proceeds from a gland secreting a viscous humour, which is supposed to serve him as a balsam in healing wounds, or as a cordial. His woolly tail is dexterously employed for catching lobsters from the hollows of brooks and rivulets, as well as for blinding his persecutors, the dogs, &c. when it is moistened with urine. But the greatest proof that bespeaks his wonderful ingenuity, is displayed by the manner he rids himself in summer of fleas, his most troublesome enemies. He first seizes with his mouth a parcel of moss, then gradually, but with retrogade steps, immerses himself in water to the point of his mouth; and, when these vermin have retreated to the moss, he suddenly drops his cargo.

The fox is not easily, and never completely tamed: when deprived of liberty, he languishes; and if kept too long in a domestic state, he dies of chagrin. His skin is furnished either with a white, grey, blueish, or black fur, which, on account of its softness and warmth, is in many parts of Europe employed for making muffs, and lining clothes. The fur of the black fox caught in the North, is sometimes sold at the excessive price of 200 guineas.

Various methods are practised for exterminating these predatory animals: they are hunted with dogs; iron traps are frequently set at their holes, which are also occasionally smoaked to expel them, so that they may the more readily fall into the snares laid for their destruction. The most common mode of taking foxes, is by means of gins: these being baited, and a train made by drawing raw flesh across his usual paths, or haunts, to the trap, he is frequently decoyed......We conceive, however, that the most easy method of reducing him to captivity, would be in imitation of that practised in the immense woods of Poland, for catching wolves alive. It simply consists in digging *circular* holes of sufficient depth, depositing fetid carcases in them as an allurement, and covering them with boards and moss, provided with a *trap-door* level with the ground. In this manner, all the foxes in the United Kingdom might be exterminated in one season, and much injury prevented, which is every year suffered by the husbandman, chiefly for the sake of perpetuating a gratuitous chace.

FOX-GLOVE, the Common, or Purple, *Digitalis purpurea*, L. an indigenous biennial plant, growing in meadows, on hedge-banks, and the sides of hills; in dry, gravelly, or sandy soils, but seldom on flat grounds, unless in very dry situations: for, though the seeds vege-

tate, the roots decay in the winter, and the plant consequently perishes. It abounds in the Midland, but is rarely seen in the Eastern counties, and produces purple flowers, which blow in the months of June and July.

The leaves of the fox-glove have a bitter nauseous taste, but do not possess any peculiar smell: they have long been used with considerable advantage, in the preparation of an ointment for sores and scrophulous tumours. If taken internally, this plant is a violent purgative and emetic :....in the country, a decoction of it, with the polypody of the oak, is frequently given in epileptic fits.

An infusion of two drams of the leaf, in a pint of water, given in doses of half an ounce, till it begin to operate, is recommended for the dropsy, especially that of the breast: in which disorder it has proved of the greatest utility: the plentiful use of diluents is ordered during its operation. It has likewise been taken in substance, at bed-time, in doses of one, two, or three grains of the leaves pulverized; and often operates as a very powerful diuretic, without producing any other evacuation. Sometimes, however, this dose excites severe and unexpected vomiting: it has also the remarkable property of rendering the pulse slower; frequently occasions distressing giddiness, and affects the power of vision.

The *Digitalis* has within a few years, been advantageously employed in *pulmonary consumptions*, and other disorders, where the frequency of the pulse requires to be abated, with a view to repress the irregular action of the arterial system, and arrest the progress of disease: and though we doubt whether any thing like medicine, or factitious air, will ever be discovered for the cure of that merciless disorder, yet we entertain a very high opinion of the powers of the fox-glove, if timely administered; but we think it our duty to add, that it is one of those active and virulent plants which cannot safely be entrusted to inexperienced persons, or empirics.

As every part of fox-glove has a very bitter and acrid taste, by which it is apt to corrode the mouth, throat, and stomach, children ought to be warned against its poisonous properties......Sweet butter-milk, or oil and vinegar, in large draughts, will be the most effectual antidotes.

[The *digitalis* as was stated under the head consumption, has unquestionably done good, in that and other diseases. But it cannot be concealed, that it has frequently failed, and that much mischief also has been occasioned by its exhibition. The causes of the failure of this medicine have been amply detailed by the Editor in a paper inserted in the *New-York Medical Repository*, vol. 1. p. 153. To this paper the reader must be referred for a particular notice on each head, all of which it may be well here to state generally.

1. The season of collecting the plant.
2. The part of the plant used.
3. The mode of curing it.
4. The adulteration of the plant.
5. The manner of exhibiting it.
6. The condition of the system at the time of use.

The most common effects observed from full doses, are vertigo, pain or throbbing of the forehead, or eyes, imperfect vision, nausea, vomiting, *reduction in the force and frequency of the pulse*, or extreme

irregularity in it. Whether the medicine be given therefore in dropsy or consumption, the greatest certainty ought to exist, that inflammatory action is prevalent in the system: otherwise much harm may be expected from the medicine. As a general rule, it may be observed that great caution is requisite in its use, though perfectly safe, when judiciously administered. Dr. M'Clean in the *Medical and Physical Journal of London*, vol. ii. p. 113, has published an admirable paper on the medical use of this plant, and advises the following form of its exhibition:

Leaves of the fresh plant 4oz.
Spirit of wine 5oz.

digest during seven days with a gentle heat and strain. Of this medicine thirty drops or less may be given to an adult thrice a day. Physicians should cultivate this plant for their own use, as it never can be depended upon when bought at the shops.]

FOX-TAIL GRASS, or *Alopecurus*, L. a genus of plants consisting of 18 species, of which Dr. Smith enumerates four, and Dr. Withering six, to be natives of England: the principal of these are the following:

1. The *pratensis*, or Meadow Fox-tail-grass, which is perennial, grows in meadows and pastures, and flowers in the month of May or June. This plant thrives naturally in moist soils only; it affords the best grass that can be sown on low meadows, or in boggy places which have been newly drained. Its seeds ripen early, and are easily collected. Although sheep pasturing on it, are said to acquire a coarser fleece, yet it furnishes a most grateful food to cattle; but, as the larvae of a species of flies devour the seeds to so great an extent, that in many spikes scarcely one will be found perfect, its cultivation is rather precarious. These insects are very minute, of an orange colour, and are the prey of the *Cimex campestris*, or Field-bug, whose mouth is peculiarly formed for searching the husks of grasses.

2. The *bulbosus*, or Bulbous Fox-tail-grass, which is perennial, grows in moist marshy situations, and flowers in the months of June and July. This species is particularly adapted for consolidating the surface of fenny situations. Hence it deserves to be more generally cultivated in such soils, in order to prevent them from being poached by the feet of cattle.

3. The *agrestis*, or Slender Fox-tail-grass, which is likewise perennial, grows in corn-fields or on road sides, and flowers in the month of July. This plant is provincially called *black-bent*; and, though a very troublesome weed, when growing among wheat, it might be sown with advantage as a meadow-grass; for, in its green state, it is much relished by cattle; and Bechstein asserts, that cows fed with it, give an unusual quantity of milk.

FRACTURES of *Bones*, are accidents which generally arise from external injury. They are either *simple*, when the skin and other integuments remain sound; or *double*, when splinters are projecting, and the fracture communicates with a wound.

If, after a severe fall, or blow, the patient feels pain, accompanied with swelling, and tension of the contiguous muscles; when a grating noise, distortion, and a loss of muscular power are perceived on handling the injured part, there is every reason to apprehend that the

bones are broken. No time should then be lost in applying to a skilful surgeon; as fractures and contusions, especially those of the ribs, are generally attended with febrile symptoms, which require the immediate use of the lancet. Meanwhile, the limb should be placed in the easiest posture, and the body kept quiet, cool, and open, by emollient clysters.

As soon as the size and situation of the fractured bone is ascertained, two or more splints made of leather or pasteboard, exactly fitting the injured limb, should be procured, and moistened previous to their application; thus, they will soon accommodate themselves to the shape of the parts, and serve to retain the limb steady with a very slight bandage; for which purpose, that of 12 or 18 tails is preferable, as being more easily applied, and removed than the usual rollers...Fractures of the ribs require adhesive plasters; the patient must almost lie straight and easy, without being exposed to opportunities of sneezing, laughing, coughing, or distending his stomach by hard food. Hence the lightest provisions, and frequent weak or diluent drink, are necessary......The most proper external application in fractures, is a mixture of equal parts of vinegar, oil and water, with which the compresses and bandages should be repeatedly moistened.

The greatest care should be taken to retain the bones, after they are replaced, in their situation, by proper compresses, or bandages, which, however, should not be too tightly applied. Much depends on the age and habit of the patient, with respect to the time necessary for performing a cure; though, in middle-aged persons, and under favourable circumstances, a fracture of the leg or thigh bone may be healed in two months; of the arm, in six weeks; of the ribs, clavicles, and bones of the hand, in three weeks. But in old age, a much longer time is generally required than during infancy.

Fragrance: See Odour.

FRECKLES, are spots of a yellowish colour, about the size of a lentile-seed, frequently appearing on the face, neck, and hands..... These discolourations are either constitutional in the individual, or arise in consequence of the jaundice, or the action of the sun upon the part. Heat, or a sudden change of the weather, often causes the skin to assume a darker colour than natural, and thus produces what is called, *tan*, *sun-burn*, and *morphew*, which differ only in degree, and usually disappear in winter.

Persons of a delicate complexion, and particularly such as have naturally red hair, are most subject to freckles in the face, and other parts exposed to the air. For the gratification of those who consider the removal of such little blemishes an object worthy of their attention, we shall communicate the following remedies:

According to Homberg, one of the best applications for dispersing freckles, is a mixture of bullock's gall with a solution of alum, which, after the latter has subsided, must be digested in the sun for three or four months in a close phial. Another preparation is made by taking 4 oz. of lemon-juice, and mixing with it 2 drams of sugar, and one of borax, finely powdered; and, after these ingredients have stood a week or fortnight in a glass bottle, the liquor will be fit for use....As, however, freckles gene-

rally vanish during the winter, and have been observed to re-appear in early spring, the sharp *morning-air* of which, though salubrious, is said to be uncommonly favourable to their re-production, perhaps the most easy method of preventing them, would be a careful attention to this circumstance.

FRENCH-MERCURY, or *Mercurialis annua*, L. an indigenous plant, growing on waste places, and dunghills, in the vicinity of towns; and flowering in the months of August and September. The whole of this vegetable is mucilaginous: when cultivated in gardens, it is dressed like spinnach, to which it is said to be greatly superior; but, if eaten in a large quantity, it is aperient. In France, according to TOURNEFORT, a syrup is prepared from the juice of the mercury, 2 oz. of which are given at one dose as a laxative: it is also used in clysters, and pessaries, in the proportion of one part of honey and two of the juice. In England, this plant was formerly in great repute as an emollient, but is at present disregarded. As an article of diet, it may be useful to persons liable to costiveness.

FRENCH-WHEAT; See BUCK-WHEAT.

FRICTION, in medicine, is the act of rubbing a diseased part with oils, unguents, and other matters, in order to ease, relieve, and cure it.

Friction is also performed with a flesh-brush, a linen-cloth, or with flannel; which last is the most eligible. It is a kind of exercise that remarkably contributes to the health of sedentery persons; for it excites and kindles the natural warmth; diverts defluxions; promotes perspiration; opens the pores; and tends to dissipate stagnant humours.

This operation is particularly beneficial to the nervous, debilitated, and studious; being an useful substitute for other exercises. Hence we recommend to such individuals to spend half an hour every morning and evening in rubbing their whole body, especially their limbs, with a clean piece of flannel. It ought, however, to be observed, that this practice will be of the greatest service when the stomach and bowels are empty.

Lastly, we venture to affirm, that the most important purposes to which *friction* may be rendered subservient to the animal economy, have hitherto been almost entirely neglected: we are, however, convinced from experience, that *medicated* frictions, or the introduction of the most active medicines into the human system, by rubbing them in properly on the surface, might be attended with the most happy effects, especially in all chronical diseases. Common sense appears to have long since pointed out this excellent method of administering medicines, even to the Indian savages, though it is little practised in enlightened Europe, where the stomach is doomed to be the field of battle, for deciding commotions and irregularities in our complicated frame. But who is hardy enough to maintain, that the digestive organ was by Nature destined to be the *exclusive* vehicle of drugs, and to serve as their common laboratory?

FROG, or *Rana*, L. a genus of amphibious reptiles, consisting of 17 species, the most remarkable of which are;

1. The *temporaria*, or Common Frog, which is an animal so well known as to render any description unnecessary. Some of its properties, however, are very singular;

its power of leaping is extraordinary, and it swims better than any other quadruped. Its body is naked, and without any tail : the fore limbs are very lightly made, while the hind legs and thighs are remarkably long, and furnished with strong muscles. As soon as the spawn is vivified, the future frog becomes a tadpole, in which state it is wholly a water-animal; but as soon as it is changed into a frog, and attains its proper shape, it immediately migrates to the shore.

These animals adhere closely to the backs of their own species, as well as to those of fishes. It has been remarked that they will even destroy pike; and it is certain that they materially injure carp, by fixing their hind-legs to the back of those fish, while their fore-legs are fastened to the corner of each eye; so that the carp become much exhausted, and frequently sink under the weight of so disagreeable a companion. See FUMITORY.

2. The *esculenta*, or Eatable Frog, differs from the former species, only in having an high protuberance in the middle of the back, which forms an acute angle. Its colours likewise are more vivid, and its marks more distinct, the ground colour being a pale or yellowish green, marked with rows of black spots from the head to the rump. Both this and the preceding species are, according to Mr. PENNANT, used as food, though rarely in this country.

FROST, is that state of the atmosphere, which causes water and other liquids to congeal, or freeze.

Frost is supposed to descend from the upper parts of bodies; but no experiments have hitherto ascertained to what depth it will extend either in earth or water, as its effects vary, according to the degree of coldness in the air, the longer or shorter duration of the frost, the texture of the earth, the nature of the juices with which it is impregnated, &c.

In cold countries, the frost frequently proves fatal to mankind, not only producing mortification, but even death itself. The hands of those unfortunate persons, who die in consequence of intense cold, are first seized, till they lose the sense of feeling; next a drowsiness prevades the whole body, which, if indulged in, is attended with imperceptible dissolution.

If animation is suspended from severe frost, the following will be the external symptoms: rigidity of the whole body; and inflexibility of the limbs, which continue in the same posture as the frozen person had adopted during the unfortunate accident; the teeth are closed; froth sometimes issues from the mouth; there is a total insensibility to all stimulants, and the extremities are partly mortified, and, in some instances, spontaneously separate.

Notwithstanding these unfavourable appearances, every exertion ought to be instantly made to restore life, if possible, by strictly adhering to the following directions; because there is a greater probability of recovering such persons, than those deprived of life, in consequence of drowning or suspension by the cord.

No external warmth of any kind must be applied to frozen persons, till the internal or vital heat, be excited; when the former also should be carefully and very gradually adapted to the manifest degree of the latter. Hence the whole process should be performed either

in the open air, or in a cold room; the body cautiously carried in a posture somewhat erect, to the nearest dwelling; the head turned gently towards the right side; and the clothes carefully taken off, without injuring the skin, or bending the limbs. These precautions are necessary, as a rough treatment may easily occasion dislocations of the joints, or fractures of the bones. Next, the whole naked frame, excepting the face, should be covered with a bed of snow from twelve to eighteen inches in thickness; or, if this cannot be procured, cold water and ice may be substituted, and cloths successively dipped in it may be spread over the whole body, especially the head and breast. After continuing these affusions, gentle frictions with flannel or soft brushes, likewise immersed into cold fluids, should be commenced; alternately making use of the shower-bath, and persevering in these attempts for an hour at least, when the body ought to be left undisturbed for some minutes. If no signs of life appear, clysters of cold water, with oil and vinegar, or six ounces of brandy, are to be given, and the former process again and again repeated; so that five or six hours sometimes elapse, before any symptoms of animation are perceptible. As soon, however, as there is the least prospect of recovery, *warm* fomentations must be resorted to; the degree of friction cautiously increased; or the patient placed in bed between two robust persons; emollient clysters prepared; and, when he is able to swallow, a cup of tea with a little vinegar, wine, or brandy, may be allowed. In many desperate instances, however, it will perhaps be proper to perform venesection, to introduce air into the lungs by means of common bellows, or those described in page 391, volume ii. or to have recourse to the electrifying machine, or the earth bath, &c. but such cases must be submitted to the judgment of the profession.

[Mr. ETON, in his account of the Turkish Empire, relates the success which attended the Russian application of goose-grease to frozen limbs after the battle of Ochakof, even when the parts were perfectly black. The parts were kept constantly covered with the grease. The fat of common fowls is a domestic remedy in the United States for the same complaint. The simplicity of these remedies ought not to prevent our using them.]

The power of cold on vegetables is well known; and though the frosts of severe winters are on the whole more injurious to vegetation than those of the spring, yet, as the former very seldom occur in this climate, the latter are productive of more extensive damage, because their effects are evident almost every year. Frosts act most powerfully on ground newly cultivated, on account of the vapours continually ascending from such soil. Trees recently cut, also, suffer more than others from the spring frosts; a circumstance which must be attributed to their shooting forth with greater luxuriance. Hence, likewise, light and sandy soils are thus more frequently damaged than firm and tough land, though both may be equally dry.

As the blossoms of fruit-trees are more particularly affected by early frosts, we shall communicate the following easy and simple methods, of securing them:

1. A rope is to be interwoven

among the branches of the tree, and one end of it immersed in a pail of water. This rope, it is said, will act as a conductor, and convey the effects of the frost from the tree to the water.

[This method has been mentioned in foreign publications upon the authority of the Chevalier BIENENBERG of Prague, by whom a *straw* rope was used with success. Dr. ANDERSON also quotes it, *Recreations*, vol. i. p. 26. A comparative experiment might easily be made of the effects of ropes composed of both materials, and it is to be wished, that the result may be published.

It seldom happens that a period of three years occurs without a late frost in the spring. Much injury was suffered in the month of April 1802; and the snow that fell on the eighth day of May in the following year in Philadelphia, and the frost on the two succeeding nights, will long be remembered.]

2. According to M. MALLET, the early hoar-frost may be rendered harmless in its effects, by pouring fresh spring-water on the trees and vines thus covered, before the sun rises. When mist or dew attends a frosty night, but has not preceded it, Dr. DARWIN supposes that a hoar-frost may be less injurious than a black frost; because the case of ice on the buds of trees, or on young grass, being instantly produced, covers them with a bad conductor of heat, and prevents them from being exposed to so great cold as is occasioned by the continuance of a black frost, without hoar or rime.

[*Means of preserving Trees from Frost.*

To explain the phenomena of the frost on vegetables, it is requisite to set forth a few physical principles.

Water occupies more space in a state of ice than when a fluid; whereas the fat and oil of vegetables occupy less in a state of congellation than in that of fluidity. The trees, especially those whose leaves drop off in autumn, imbibe during the summer a considerable quantity of humidity, and evaporate in proportion.

According to the experience of the celebrated and Rev. Mr. HALES, a tree clothed with leaves imbibes from the atmosphere thirty times more water than one which is deprived of leaves. The vessels of the young suckers are larger in proportion than those of the trunk, and consequently they contain a greater quantity of humidity.

Trees which retain their leaves winter and summer imbibe but little water; the juice having in these trees a very slow motion, becomes more glutinous, and keeps in a certain though slow motion during the winter: this is also the reason why those trees do not shed their leaves during the winter.

Those principles are applicable to the trees that lose their leaves in autumn; and which, having retained them late, have imbibed during the summer a great quantity of moisture; should they be surprised by the frost in the winter, before their juices are changed into a glutinous nature, that does not so easily freeze or expand, those aqueous juices will congeal and occupy more space, and by their dilatation burst the vessels of the young branches; the juice extravasates, especially in young suckers, and occasions thereby, as it does

likewise in animals, the death of the tree, by a kind of hemorrhage, which nothing can stop.

Experience proves the truth of these facts. The trees of a warm country which are transferred to a colder climate, in the beginning of the spring, before the sap is in motion, bear hard winters without injury; but if they are planted when the sap has begun to rise, or too early in autumn, when the sap is still in motion, the trees being in the winter replete with that aqueous moisture, and which has not had time for conversion into a glutinous juice, perish through the causes which we have just now set forth.

In England, in the winters of 1708 and 1709, almost all the trees perished, the mulberry tree excepted, whose leaves had been plucked off before the winter, for the nourishment or food of silk-worms. Those trees having been deprived of their leaves betimes, were no longer replete with that aqueous juice which the leaves imbibe in abundance.... Here then we perceive the wise disposition of Nature, which requires the trees to shed their leaves before the winter, because they are as injurious to them in that season as they are favourable to them in another.

As the trees that come from the southern countries contain more aqueous juice than those that grow in the north, those trees transplanted in this latter climate are more liable to perish by frosts; but Nature herself presents to us the remedy to preserve those trees from the frost; this is, to pull off the leaves before they fall of themselves; observing nevertheless the footsteps of Nature, that is to say, not to perform this in one day, but by degrees, so that by the beginning of winter, the trees should be almost quite bare. Great attention must be paid not to pluck off the buds at the same time. Through this method, trees that are somewhat delicate are preserved, because the juices of such trees, becoming thicker before the winter, and being likewise less abundant, the tree is no longer liable to the same inconveniences.

Before you act upon a large scale, an experiment may be easily made upon the small branches of the tops of trees, which most commonly are frost-bitten; by divesting them of their leaves betimes, their freezing will be prevented.

They should first begin early to disrobe the most aqueous trees, as well as the exotics, and those recently planted, rather than those that have been a long while in the country. One may in general judge that the trees whose leaves grow first in the spring, are the most aqueous, and indeed, Nature, always regular in her performances, deprives them of their leaves, first, in autumn.

The above mode of preventing the effects of frost on fruit trees, was first noticed by Mr. STROMER, Professor in the university of Upsal, a translation of whose paper is inserted in a collection of "*Select Essays on Commerce, Agriculture*," &c. London, 1754, 8vo. These essays are said to have been translated from the *Journal Economique*, published at Paris. The same principles were again published in a late French work, entitled the "*Dict. d'Industrie*," in which the Editor first saw them, and from the supplement published by Dr. WILLICH, it appears a similar article is inserted in the "*Giornale*

Encyclopædico of Vicenza, by *M. De San Martino*, as an original paper.

Mr. Blanchet attributes the bursting of trees in winter, to the extrication of the air from ice: and observes that the air, a permanently elastic fluid being compressed, and forced to give way to the particles of water, which cold, or the attractive power of the atoms of bodies, draws violently together, it follows that the ice into which the water is converted, must break asunder, in order to afford a passage to this aeriform substance, which cold can neither condense nor make solid, and by separating the ice into irregular masses, must rend or shiver, with a crackling noise, the vessels no longer able to hold it....See *Med. Repository*.]

In order to recover and preserve such trees from total decay, as have evidently been injured by severe winter-frost, a correspondent has favoured us with the following easy and expeditious remedy; for the success of which he appeals to his repeated experience: When a tree appears to have suffered from intense cold, he advises to make longitudinal incisions in the bark, extending to the whole length of the trunk, on the north, west, and east sides; but never in a southern direction. As the *west-winds* are dry and piercing, very few and superficial slits only should be made on that side. This operation ought to be performed in the month of March, before the first sap rises; and repeated in June, while the second sap ascends; but always so managed, that only the uppermost bark, or *epidermis*, be divided; as too deep an incision, though harmless in the spring, might be attended with fatal consequences in the heat of summer. In trees, however, which are thoroughly frozen, it will be useful to make deeper cuts; thus to give vent to the stagnant fluids, and promote their circulation. These cuts should be directed against the centre of the tree, drawn in a straight line downwards; for, in the contrary case, the bark is apt to separate in chinks, afford shelter to vermin, and eventually frustrate the attempt. By a strict adherence to these rules, it will be found that apple-trees, in particular, when slit in every direction, (except the south side), retain all their bark; others, which had undergone one-half of the operation, were but partially preserved; and such as had received only two cuts, retained only the intermediate portion of the bark, from which they produced new shoots. This simple method is farther attended with the additional benefit that, while contributing to the growth of the tree thus affected, it tends to prevent the decay of those which have in the preceding year been injured by the depredations of caterpillars, and the subsequent stagnation of their fluids.

Although it has been generally believed, that frost meliorates the soil, and especially clay-lands, yet as ice contains no nitrous particles, such improvements can only be of a transitory nature, by enlarging the bulk of some moist soils, and leaving them more porous for some time after the thaw; but, when the water has exhaled, the ground becomes as hard as before, being compressed by the incumbent weight of the air....See also Clay.

Nor is the salutary influence of frosty seasons, on the health of mankind, in the least confirmed by the annual bills of mortality; as

many old and debilitated persons, whose vital heat is insufficient to excite into action their vessels, already too unsusceptible of irritation, die in consequence of long frosts, during severe winters..... Birds, and other wild animals, as well as tender vegetables, perish benumbed from the same cause.... It deserves, however, to be remarked, that a sharp dry frost does not affect the human skin with that sensation of chilly and piercing cold which we experience, when the air is loaded with moisture, the temperature of which is near the freezing point. This remarkable difference arises from the intense degree of cold produced by the evaporation of fluids, which continually takes place on the surface of living bodies, where it naturally produces a more perceptible effect, than the simple contact of *dry* air would occasion, when it is but a few degrees below freezing. To the young and robust, therefore, frost is more pleasing than moist air; as, in the former, they are able to keep themselves warm by increased exercise; which, in the latter, only tends to promote and render the evaporation more severely felt on the skin. For the same reason, Dr. DARWIN observes, severe and continued frosts "destroy the children of the poor, who want food, fire, and clothing, in this harsh climate."

To preserve vegetable roots, as well as fruit, from the effect of cold, the following directions will be sufficient: Dry sand, and cut straw, are eminently adapted to that purpose. Potatoes, turnips, onions, &c. should be loosely placed on sand, either under or above ground, and slightly covered with cut straw or chaff: but carrots and parsnips, we are informed, may be kept during the whole winter, by placing them in rows or heaps, so that their tops project at the sides, being the reverse of the method followed with turnips when packed in carts....See also APPLES, vol. i.

If, notwithstanding these precautions, vegetables should be injured by the frost, it will be advisable, especially with *frozen potatoes*, to immerse them in cold water for a short time, on the approach of a thaw. By this expedient, the frosty particles are gradually extracted, and the vegetating principle is preserved, after the severest season.

On the other hand an intense degree of cold is also attended with some good effects: Thus, *aromatic spirits* possess a weaker flavour when newly distilled, than after they have been kept six or seven months, especially during the winter season. Experience has evinced, that this favourable change was produced only by the influence of *cold*; and M. BAUME found, that by immersing quart-bottles filled with liquors, into a mixture of pounded ice and sea-salt, for six or eight hours, the spirit proves as grateful to the palate as that which had been kept for several years....GEOFFROY remarks, that simple waters also acquire a more agreeable flavour, after having been for some time exposed to the effects of cold....See likewise VINEGAR.

FRUIT-TREES, are such as bear fruit, namely, APPLE, CHERRY, PEAR-TREES, &c. For the particular culture of which we refer to those articles. At present, we

shall confine ourselves to remarks equally applicable to orchards, and to single trees.

While young, no tree should be suffered to bear a large quantity of fruit: and, if they abound with blossoms, the fruit should be gathered as soon as it is formed; leaving only half a dozen of the produce, to ascertain its size and quality. By this measure, the trees will not only produce larger and finer fruit, but, by being kept clear, the leading and collateral branches will every year become more vigorous. Nor ought any young plant, or newly-engrafted tree, to be permitted to *run mop-headed*, as it will make no progress, till each branch has acquired a determined leader: for, if the growth of a tree be prevented, it will be extremely difficult to throw such energy into the system, as to enable it to grow freely.

As long as fruit-trees continue in the nursery, it will be requisite to cut down the head, in order to give strength and symmetry to the stem: it will also be useful to shorten most of the grafts, lest they should be blown out by the wind: these operations likewise contribute to swell the buds.

The ingenious Mr. BUCKNALL particularly recommends, not to place the rows of trees in a situation either directly north or south, but rather inclining to the east, as the sun will then shine upon them in the early part of the day during the spring, and thus dissipate the vapours collected in the night; which, if suffered to condense, will stint the fruit in the earlier stages of its growth. He farther observes, that if the *shaws* (or shades) be properly attended to, the trees being placed in this position, will be enabled to withstand the power of the winds; nor will they be affected by blight. The *shaw* will also protect the fruit from the autumnal winds, by which half the crop of fruit is not unfrequently blown down, before it is ripe: and, as the heads are at that season of the year laden with fruit and leaves, many trees are torn up from the ground, or so lacerated as to be completely spoiled: a misfortune that might be effectually prevented by a proper disposition of the shades.

In the *Transactions of the Economical Society of Leipzig*, we meet with a communication from the Rev. Mr. GERMERSHAUSEN, on the means of promoting the growth of young fruit-trees, especially in grass land. This method simply consists in spreading *flax-shows*, or the refuse of flax, after it has been *combed*, on the soil contiguous to the trunks of the trees, as far as the roots extend; by which means their size as well as their fertility is remarkably increased. He mentions an instance, where an old plum-tree which, being in a languishing state, in a grass-field, was treated in the manner above directed, and thus not only acquired a new bark, but produced larger and better tasted fruit: the young shoots also, which formerly grew up around the stem, were prevented from sprouting forth, because the refuse of the flax excluded the access of air to the trunk, and imparted additional nutriment to the roots. The leaves falling from the trees in autumn, may be substituted for the *flax-shows*, if these cannot be easily procured; but it will be necessary to dig a small trench for the reception of the

decayed leaves, and also to cover them with tiles, flat stones, or a log of wood, to prevent their dispersion by the wind. This precaution however, is not required with the refuse of flax, which adheres so closely to the soil, as to withstand the most violent storm.

Although gardeners bestow the strictest attention on orchards, it sometimes happens that the bark of trees is stripped off by sheep, or by other accidents. In this case, it has been recommended by Mr. W. FAIRMAN, of Miller's House, Lynsted, Kent, to take off the arms of such trees as are damaged; to cut slips of the rind, about two or three inches in width, and to place four or five of them perpendicularly round the naked part. The damaged rind is previously to be cleared away, the sound bark somewhat raised, and the slips inserted beneath it, to promote the circulation of the sap. These dressings are next to be bound very tight with rope-yarn; and a composition of loam and cow dung, together with a small proportion of drift sand, should be applied, over which some old sacking, or similar stuff, ought to be fastened. Mr. FAIRMAN adds, that he made an experiment with this mode of treatment, in the spring of 1794, on some trees which had been much damaged by sheep, and that it completely succeeded, the slips adhering closely, and being full of sap.

Fruit-trees like the rest of the vegetable creation, are the prey of a variety of insects, of which few are more destructive than those infesting apple, pear, cherry, oak, white-thorn, and similar trees..... They deposit their black eggs in clusters, resembling withered leaves, and which are twisted by a cobweb round the uppermost branches. These notorious insects are hatched in the spring, when they assume the form of very diminutive caterpillars, which destroy every thing before them, and rapidly propagate in the most unfavourable weather. They damage oaks very materially; devour the white-thorn, and kill the plant: apples and pears, likewise, receive great injury. The only remedy hitherto known of exterminating such noxious vermin, is to cut off all the twigs or shoots of every tree on which these nests of insects appear; to collect them in a heap, and burn them as soon as the weather will permit; for where this necessary operation is deferred till the summer approaches, the insects increase prodigiously, and commit irreparable damage. See CATERPILLAR and INSECTS.

The disorders to which fruit-trees are subject, are various; the most fatal are, BLIGHT, CANKER, MILDEW, MOSS, &c. to which we refer. See also DISEASES of PLANTS.

The effects of frosts are likewise often fatal, especially to the more tender fruit-trees. With a view to obviate such damage, different methods have been suggested; the most parcticable of which we have noticed in the preceeding article. We shall, however, add a few additional hints, in order that the reader may select such as are the most simple and least expensive.

In a communication from a Swedish agriculturist to a respectable periodical work, published on the Continent, the following expedient is stated to have been suc-

cessfully employed, to protect fruit-trees from the vernal frosts. As soon as the weather begins to grow cold in autumn, large quantities of water are to be poured on the trunks of such trees, so that they may receive an early impression of the cold. In the spring, snow is to be accumulated round their stems; which retards vegetation, and prevents them from blossoming too early. In consequence of this irrigation, the buds shoot forth at a period, when no apprehension need be entertained from the attacks of the frost that frequently happens during the nights of spring. Such practice of watering the borders of trees, is said to increase the heat in them, by accelerating the motion of their juices, if the soil of such border has been properly opened and prepared. [According to *Tilloch (Phil. Mag.* vol. 3d,) Colerus, a German writer recommends "to dig a trench around the root of a tree, and to fill it with water, or to keep the roots moist until it has blossomed." A tree thus backened in its vegetation will not probably be attacked by the late frosts of our variable climate.] It is farther recommended, to add one ounce of common salt to every gallon of water, where those borders are old, and have been impoverished by producing many successive crops; or if they have been manured with dung not sufficiently putrified.

[*Means of preventing the flowers and fruit from falling off, and of retarding their opening.*

"The means proposed to retard the opening of flowers, consists in making, in the autumn, a ligature on the stems of the young trees: that compression slackens the motion of the sap's rising, and the tree blossoms the later.

Fruits are also likely to fall off as well as flowers. We see trees, which after having had a great abundance of flowers, are covered with young fruit, that promises the most plentiful crop: but it sometimes happens, that they almost all drop off. This accident is but too frequent with apple and pear trees.

The way to remedy this inconvenience is to sprinkle the root or foot of the trees when they are in blossom with five or six buckets of water; and, to preserve the humidity, the bottom must be covered with straw, which prevents too hasty an evaporation of the water: by these means, the flowers and buds are preserved from falling off. The slight frosts which overcome unfolded flowers, cause the weak and tender ones to perish.

We read in M. L'Abbé Rosier's *Journal for the year* 1772, that Mons. Mustel, having for two successive years cut off the petals of pear blossoms or flowers, observed that the fruits were more successful than when they were left on; but that care should be taken to cut the *stamina*: so that in 1772, a year in which the pear trees bore but little fruit, a number of those whose plants had been cut off, were loaded with beautiful fruit." *Dict. d' Industrie.*]

There is a method of making *fruit grow, during winter:* and though we are no advocates for premature productions, we have abstracted the following process for the satisfaction of the curious, from the 9th vol. of the *Annual Register* for 1763: Let the trees be taken up by the roots in the

spring, at the time they are about to bud; carefully preserving some of their own soil among the roots. These are to be placed upright in a cellar till Michaelmas, when they are to be put into vessels with the addition of fresh earth, and deposited in a stove or hot-house, being regularly moistened every morning with rain-water, in which sal ammoniac has been dissolved, in the proportion of one ounce to a quart. Thus, in the month of February, the fruit will appear..... The same method is applicable to rose-trees, and flowers; which last, when sown in pots at or before Michaelmas, and watered in a similar manner, will blow towards the end of December.

In order to ascertain when fruits, for instance, apples and pears, are sufficiently ripe to be gathered, it is requisite to attend to the colour of the skin inclosing the seeds. During their infant state, there is no cavity round the kernels, but they are in contact with the seed-vessel. In a subsequent period, when the fruit has exhausted the nutritious matter, the cells containing the seeds become hollow, and the latter assume a dark colour. This, Dr. DARWIN observes, is the proper criterion by which to judge when such fruits should be gathered; as it indicates that they will not continue to increase in size, but waste and become hollow, by absorbing the mucilaginous particles from the centre.

One of the most easy methods of *preserving fruit*, is that of depositing it in *ice-houses*, where it may remain in a frozen state for a considerable time. And, if the fruit be afterwards gradually thawing, by covering it with melted ice, or immersing it in cold-spring-water, it will loose but little of its flavour, provided it be consumed on the same day. Fruit may also be preserved, by keeping it in pits dug in a dry soil, or in dry-cellars, or even in barns, if the temperature be between 32 and 48 deg. of FAHRENHEIT's thermometer; that is, such as will neither induce frost, nor vegetation. These pits or magazines, however, ought to be covered with such materials as are calculated to repel heat, and to absorb any accidental putrid exhalations, and thus retard the progress of putrefaction. Hence Dr. DARWIN recommends the fruit to be covered first with pulverized charcoal, one or two inches thick, over which is to be laid a stratum of saw-dust, and over the latter, a thick, impenetrable thatch of straw: thus, seeds and fruits may be stored up for ages, without vegetating or decaying. He likewise mentions another mode of preserving fruit, by *heat*. As fermentation will not commence in the heat of boiling water, or 212 deg. and, as that degree of temperature can be easily procured by steam, or by the vicinity of vessels containing boiling water, he is of opinion that such fruits as are used for culinary purposes throughout the year, may be kept in a fresh state, by putting them into bottles, and exposing them to the wasted steam of engines; or, by immersing them in the hot water that flows from such steam when condensed; or, by placing the bottles near the boilers which are fixed beside kitchen fires.

Before we conclude this article, we shall briefly observe, 1. That the cutting and pruning of young fruit-trees retard their bearing; though such necessary operations

contribute to the richness and flavour of the fruit, as well as to the beauty of the tree. 2. That those plants which produce kernels, yield fruit later, but in greater abundance than *stone-fruit* trees: the time for bearing required by the former being upon an average five years. 3. That stone-fruit, figs, and grapes, generally yield abundantly at the expiration of three or four years; bear full crops in the fifth and sixth years; and, if judiciously managed, will continue to produce for several seasons. 4. That the fruit of wall-trees, in general, attains to maturity sooner than that growing on standards; and the fruit on the latter, earlier than that produced by dwarfs. 5. That the produce of all wall-trees, which are planted in the south and east quarters, ripens generally about the same period; though that growing in a southern exposure is often earlier than the fruit in the east; while that towards the west is later than either of the former, by eight or ten days; and that exposed to the north, by fifteen or twenty days. Lastly, as the freezing winds of this country proceed from the north-east, we shall, under the head of ORCHARDS, give more particular directions relative to the most proper situation of fruit-trees, and illustrate this interesting branch of husbandry by an appropriate engraving. See also ENGRAFTING, PLANTATION, PRUNING, &c.

The following directions for picking, preserving, and packing fruit for carriage, we insert on the authority of Mr. FORSYTH.

"All apples, pears, &c. ought to be carefully gathered by hand, and laid in baskets containing dried grass, to prevent them from being bruised; and, if they fall spontaneously, some dry barley-straw or pease-haulm, should be prepared for their reception on the ground: in the latter instance, the fruit ought to be separated from, and sent to the table before that which is collected by hand; and such, as may be accidentally bruised, ought to be reserved for culinary purposes; because it cannot be long kept in a sound state.

When all the fruit is collected, it should be conveyed to the store-room; laid gently in small heaps, on dried grass; and their tops be covered with short grass, in order to *sweat*. Here it may remain for about a fortnight; during which time each apple, pear, &c. must be occasionally wiped with a dry woollen cloth, and those exposed on the surface should be placed towards the middle of the heap. At the end of this period, all watery ingredients that may have been imbibed during a wet season, will be evaporated; the heaps should then be uncovered, and each article carefully wiped; separating those which may be injured, or unfit for keeping.....During this process of sweating, the windows of the store-room, excepting in wet or foggy weather, ought to be continually open, in order to discharge the moisture perspiring from the fruit.

The usual method of storing apples, pears, &c. consists in laying them on clean wheaten straw; but, in this case, it will be necessary to examine them frequently, and to remove such as begin to decay; because the straw, by absorbing moisture, will become so tainted, as to communicate an unpleasant flavour.

Another mode of preserving

fruit, is that of depositing it on shelves made of well-seasoned white deal, and covered with coarse thin canvass, on which the articles are to be laid, after being wiped perfectly dry: a piece of linen cloth, or thin flannel, or whitish-brown paper, must then be placed on the top, with a view to exclude the air, and to guard against the injurious effects of frost. Farther, it should be turned several times during the winter; because the more tender and delicate kinds are apt to decay on the lower side, if they remain long in a quiescent state; even though they may have been completely sound, when first selected for that purpose.

In the vicinity of the metropolis, where fruit is kept in store-houses for supplying the markets, it is generally packed in soft paper, disposed at the bottoms and around the edges of baskets or hampers: a layer of fruit is then put in, and covered with sheets of paper; after which successive strata of fruit and paper are placed regularly, till the vessel be full. The top is then provided with three or four double folds of paper, both to exclude the air and frost. Every sort is arranged in distinct baskets, to which labels are affixed, containing the name of the fruit, and the period when it will be fit for use.

The best mode of preserving fruit, however, in the opinion of Mr. Forsyth, is that of packing it in glazed earthen jars, which ought to be kept in dry apartments. For this purpose, apples and pears are to be wrapped separately in soft paper, and laid at the bottom of the vessel on a thin stratum of well-dried bran: alternate layers of bran and fruit are then to follow, till the jar be filled; when it should be gently shaken, in order to settle its contents. Every vacancy must now be supplied with bran, covered with paper, and the whole secured from air and moisture by a piece of bladder, over which the cover of the vessel must be carefully fitted.

With respect to the packing of fruit, which is to be conveyed to a considerable distance, there cannot be taken too great precaution. Boxes should, therefore, be made of strong deal, and of various sizes, in proportion to the quantity they are designed to contain: these will be proper for melons wrapped simply in paper; and also for pears, peaches, nectarines, plums, and grapes, being enveloped first in vine-leaves, and then in paper; but for cherries, and currants, flat tin boxes will be required....If the fruits last mentioned are to be carried, successive layers of fine long moss, and cherries, ought to be arranged, till the box be full; so that, when the lid is closed, they may be in no danger of being injured by friction. For transporting melons, &c. similar strata of dried moss, and short, soft, dry grass, are to be formed, in which the fruit is to be stored according to the manner above directed; being selected as nearly of the same size as possible; care also must be taken to place the largest at the bottom, and to fill up every interstice.... For the sake of farther security, each box ought to be provided with a strong lock and two keys; so that the persons packing and unpacking the fruit, may be respectively in the possession of one. The moss and grass should always be returned in the boxes;

and, with a little addition, they will serve the whole season, provided such materials be shaken up, and well aired, after each journey; in order that they may remain sweet. Lastly, it will be necessary to cord these boxes firmly, with a view to prevent any accidents that may arise during their conveyance. If this method be carefully pursued, it will certainly be attended with success; for, Mr. FORSYTH observes, that fruit thus managed, may be sent with perfect safety, either by coaches or waggons, to the remotest part of the kingdom.

Among the various distinct publications which have appeared on this subject, the following are allowed to possess considerable merit: "*A Treatise on Fruit-trees*," &c. by THOMAS HITT; 8vo. 2d edit. 5*s*. 3*d*. Robinson, 1768;....and "*The British Fruit Gardener, and Art of Pruning*," &c. by THOMAS ABERCROMBIE; 8vo. 4*s* bound, 1779.

[We shall now present the reader with an abridgement of the admirable observations of Dr. DARWIN, on the means of *increasing the number of fruit buds, and of enlarging and perfecting fruit*....See also article BUD.

1. *To increase the number of Fruit Buds.*

"The terms strength and weakness, in their usual acceptation, when applied to the vegetation of trees, are metaphorical expressions, or denote the effect or consequence, rather than the cause, of their bearing leaf-buds or flower-buds, as spoken of in *Phytologia*, Sect. IX. 2. 7. For the production of leaf-buds, or flower-buds, though it may be said to accompany the greater or less vigour of a tree, depends on the facility or difficulty, with which the long caudexes of the new buds, which constitute the filaments of the bark, can be generated.

"Thus the new vegetable production formed in the axilla of a leaf about Midsummer, which is called a leaf-bud, consists of many embryon buds, perhaps twenty or thirty, which are to form the next year's shoot; and each of these must be furnished at the same time with a long caudex in miniature, extending from the leaf or summit to its radicle or base; which consists of umbilical vessels for its vernal nutriment, and of a continuation of other absorbent vessels, and of arteries and veins, as described in *Phytologia*, Sect. VII. 1. 7. which passes along the branches and trunk, from the apex or leaf of the bud in the air, to its base or radicle in the ground; and which thus forms the new bark, and contributes to thicken and strengthen the trunk and branches of the tree; because each new leaf-bud with its summit, caudex, and radicle, continues afterwards to adhere to the parent tree.

"But the production in the axilla of a leaf, which is called a flower-bud, or fruit-bud, consists only of an individual vegetable with the rudiments of a number of flowers, with one caudex for its growth and nutriment; for as the seed falls from the tree, when ripe, no new apparatus of caudexes in miniature for each individual seed, as for each individual embryon-bud, is required to pass down the trunk into the ground to form a new bark; and thus to thicken and strengthen the trunk and branches.

"Add to this, that not only the

seeds require no new caudexes to pass down the trunk, but that probably the stamina and coral of each flower strike their roots only into the blood-vessels, which communicate with the bractes, like mosses or fungusses, which grow on trees, or like cuscuta, (dodder,) viscum, misletoe, and tillandsia, and epidendrum: and therefore require no caudexes and radicles to pass down into the ground.

"Whence it appears, that by rendering it more difficult for new buds to acquire new caudexes along the branches or trunk from the summit into the ground, the tree will be necessitated to produce flower-buds in preference to leaf-buds; a theory, which was first delivered in the *Botanic Garden*, vol. i. canto 4. l. 470, note, and explains the whole art of the management of fruit-trees.

"Vegetables therefore in respect to their mode of propagation are either viviparous or oviparous...... The live progeny of vegetables consists of the buds, which rise on their branches in the bosom of each leaf, or on its long caudex extending down the bark of trees; or which arise on the bulbs, knobs, wires, or scions, from the broad caudex on the roots of herbaceous plants. The egg-progeny of vegetables consists in their seeds, with the previous apparatus of the flower, and concomitant nutriment in the fruit and cotyledons. And as plants, or parts of plants are said to be in greater vigour, when the vivaparous progeny is prevalent; as the caudexes of this adherent offspring form a new bark, and thence thicken and strengthen the trunk and branches; and to be in less vigour when the oviparous progeny is prevalent; as the seeds fall from the tree, and consequently require no caudexes to form a new bark, and thence to thicken and strengthen the tree. We shall generally use the word viviparous instead of vigorous, when applied to vegetables, which *generate leaf-buds principally*; and *oviparous* instead of *weak*, when applied to vegetables, which generate flower-buds principally; for the words vigorous or weak may properly express the greater or less health o vegetables in both these situations.

"The following methods will contribute to prevent the young buds from so readily acquiring new caudexes on the trunk of the tree; and will therefore retard the generation of leaf-buds, and consequently assist the generation of fruit-buds; and should be executed about Midsummer, or soon after, as at that time the new buds are formed.

"1. *The first method consists in bending the viviparous branches to the horizon, which converts them into oviparous ones*, for by the curvature of such branches the bark will be compressed on the under side, and extended on the upper side of the curve, and its vessels on both sides will be contracted in their diameters, and thus the difficulty of producing new caudexes for the generation of embryon leaf-buds will be increased, in whatever state of miniature they may be conceived to exist.

"A curious fact seems to be established by the experiments of Dr. Walker in the first volume of the *Edinburgh Transactions*, which shews, that the bending of a branch even below its insertion into the trunk does not impede the ascent, or derivation of the vernal sap-juice into it; but on the con-

trary, that it rather appears to assist it, resembling in some measure a capillary syphon, as mentioned in *Phytologia*, Sect. III. 2. 4. which may be owing to the vernal sap-juice ascending principally, or entirely, in the sap-wood, as appears by the new leaves expanding to a certain degree on decorticated oak-trees, as shewn in Sect. IX. 2. 8. And as the vessels of this alburnum are more rigid, they may be less liable to contraction or coarctation by bending down the branch, than the bark-vessels, as well as from their being placed within the latter, and therefore less liable to compression beneath the curvature, and to elongation above it.

" Whence it appears, that the bending down a branch of a fruit-tree below the horizon does not diminish the nutriment of the fruit-buds, but rather increases it; as Dr. Walker observed these buds to grow sooner and larger at the extremities of the bended branches than on other parts of equal height.

" It was asserted by Mr. Lawrence, that the more the branches of any tree are carried horizontally, the more apt that tree is to bear fruit; and that the more upright or perpendicular the branches are led, the more disposed is that tree to increase in wood; which he ascribes to the bending down of the branches impeding the circulation of the sap....*Art of Gardening*. Mr. Hitt in his *Treatise on Fruit Trees*, affirms, that if a vigorous branch of a wall-tree be bent down to the horizon or beneath it, it loses its vigour, and becomes a bearing branch; and therefore recommends his method of nailing the branches of wall-trees, and of tying those of espaliers, in a horizontal direction or still lower; as in this constrained situation there must occur greater difficulty, I suppose, in the production of the new caudexes, necessary for the embryon progeny of buds, upwards or horizontally along the bended branch, contrary to their natural habits, as well as from the compression of the bark beneath the curvature of the branch, and its extension above it; whence more flower-shoots are produced, which do not require new caudexes to pass along the bended branch; but which permit their progeny, the seeds, to fall upon the earth, and penetrate it with their new roots.

" In Lord Stafford's gardens at Trentham, I remember to have seen many years ago some standard dwarf apple-trees with all their branches bent down, and fixed on a slight frame-work about a foot from the ground; which seemed to be uncommonly prolific, as a circle of white and purple flowers, twenty feet in diameter on branches radiated from a centre, appeared to a distant eye like a lunar halo, or a carpet of rich embroidery.

" The greater production of fruit-buds on branches bended to the horizon must contribute, I should suppose, to the prolific effect of training nectarine and peach trees on tiles laid on the ground, or on the gentle declivity of a bank of earth facing the south, which has lately been recommended by some one, whose name I do not recollect, who gained a patent for his discovery. And it is indeed probable, that both these modes of training fruit-trees, one of which may be called an horizontal wall-tree, and the other an horizontal espalier, would repay the labour of

the horticultor; as they would be exposed to a more vertical sun in summer,, which might more certainly ripen their fruit; and would be kept somewhat backwarder in the early spring, by the greater obliquity of the sun-beams, and might be therefore less liable to injury from the vernal frost; and when in blossom might easily be covered in the night, when necessary, by mats thrown over them supported by stakes with horizontal poles on them.

" 2. Secondly. *The twisting, or wire, or tying a waxed string round the viviparous branches of a tree, induces them to become oviparous*, as observed by Mr. Whitmill, who bound not only the viviparous shoots of various wall-trees with strong wire, but also some of their large roots, and thus increased the product of his fruit....Bradley *on Gardening*, vol. ii. p. 155. And M. Buffon produced the same effect by a tight cord round the branches, which previously produced leaf-buds instead of flower-buds. *Act. Paris. ann.* 1783.

" M. Buffon concludes from the above experiments, that an engrafted branch bears fruit more copiously, and more certainly, from its vessels being compressed by the callus around the ingrafted junction, which may have this effect, and at the same time contribute, by preventing the luxuriant growth of its leaf shoots to render the tree of more dwarfish stature. I am informed, that many dwarf apple-trees, which are now planted in garden pots both in France and England, bear much fruit, and are elegantly placed in the centre of a desert at luxurious tables; and that the principal art of producing them consists in ingrafting them three or four times, scion on scion; so that the stem is compressed by the callus of three or four ingraftments before the branches are permitted to divaricate; and the trees are thus rendered beautiful dwarfs.

" The effect of thus compressing the bark by a wire, or a cord, or by the callus round the junctures of the ingrafted scions, is undoubtedly accomplished by the increased difficulty opposed to the production of the caudexes, for each new embryon leaf-bud, as above explained, and the consequent generation of flower-buds instead of them.

" 3. Thirdly. *The wounding, or breaking a viviparous branch, or cutting away a ring of the bark, as of pear-trees, or a semi-cylinder of the bark of other fruit-trees, induces them to become oviparous.*

" Where young trees discover too great vigour, Mr. Lawrence advises to cut the most vigorous shoots two parts in three through, leaving a large notch, that the wound may not heal too soon; which he adds will both render them fruitful, make them more readily conform to the wall or espalier, and preserve such as are dwarfs from too much aspiring in very strong branches, especially of pears; he recommends two or more such incisions to be made in the same branch.

" Another method he proposes, is to break the too vigorous branches half through with the hand, which he has practised with success in apricots and peaches, when the branches were formed directly forward from the wall, and these branches have continued several years to bear fruit, though some have occasionally died by effusing gum; and though these incisions

and breaking the branches may be performed at any time of the year, he prefers the spring on account of the wet or frost of winter. *Art of Gardening.*

" A complete cylinder of the bark about an inch in height was cut off from the branch of a pear-tree against a wall in Mr. HOWARD's garden at Litchfield, about five years ago; the circumcised part is now not above half the diameter of the branch above and below it, yet this branch has been full of fruit every year since, when the other branches of the tree bore only sparingly. I lately observed, that the leaves of this wounded branch were smaller and paler, and the fruit less in size, and ripened sooner than in any other parts of the tree; and another branch has the bark taken off not quite all round with much the same effect.

" The theory of this curious vegetable fact receives great light from the foregoing account of the individuality of buds. A flower-bud dies when it has perfected its seed, like an annual plant, and hence requires no place on the bark for new caudexes to pass downwards; but on the contrary, leaf-buds, as they advance into shoots, form new buds in the axilla, of every leaf; which new buds require new caudexes to pass down the bark, and thus thicken as well as elongate the branch. Now if a cylinder of the bark be destroyed, many of these new caudexes cannot be produced; and thence more of the buds will be converted into flower-buds.

" In this curious circumstance, the caudexes of the buds of the tree above the decorticated part seem to have emitted short radicles into the alburnum; the vessels of which must thus have acted as capillary tubes between the upper and lower caudexes of those buds; as capillary tubes will raise water by the attraction of their internal surfaces nearly to their summits, when they are not too high in proportion to their diameter; but water will in no case flow over their summits, but will always stand with a concave surface below the uppermost rim of the tube in which situation it may readily be absorbed by vegetable radicles; and may be supplied from beneath, by the sap-juice raised by the vegetable action of the absorbent vessels of the caudexes, whose radicles terminate in the earth.

" It is customary to debark oak trees in the spring, which are intended to be felled in the ensuing autumn; because the bark comes off easier at this season; and the sap-wood, or alburnum, is believed to become harder, and more durable, if the tree remains till the end of summer. The trees thus stripped of their bark put forth shoots as usual with acorns on the sixth, seventh, and eighth joints, like vines; but in the branches I examined, the joints of the debarked trees were much shorter than those of other oak-trees, the acorns were more numerous, and no new buds were produced above the joints, which bore acorns. From hence it appears, that the branches of decorticated oak-trees produce fewer leaf-buds, and more flower-buds.... And secondly that the new buds of debarked oak-trees continue to obtain moisture from the alburnum after the season of the ascent of the sap in other vegetables ceases; which in this unnatural state of the debarked tree may act as capillary tubes, like the alburnum of the

small debarked cylinder of a pear-tree above mentioned; or, as the vessels of the alburnum may not yet have lost their vegetable life, they may continue to absorb sap-juice or water from their radicles, and carry it to the buds at the summits by their spiral contractions as in the bleeding season.

"The parts of a tree immediately below a decorticated or a strangulated branch or root will generally become viviparous, and will thence be said to be increased in vigour; that is, it will produce new leaf-buds, and those of a luxuriant appearance; because the injury of the bark of the branch or root will prevent the parts above from receiving so much of the nutritive sap-juice, as in their sound state; and consequently the parts beneath will possess more of it; and also because these new buds are generated from a lower part of the caudex, and will thence be a few years before they will acquire that maturity, or puberty, which is necessary for the generation of flower-buds, or the production of a sexual or seminal progeny; whence by strangulating or decorticating the alternate branches of a pear-tree they will bear for six or eight years; and the other alternate ones will become in the same time strong and vigorous, ready to undergo a similar operation, when the former cease to be of other use; but the fruit will become smaller in size, though in greater number, and ripen earlier in the season.

"In the same manner new root-scions are said to be produced by strangulating a branch of a root near the surface with a tight string, or by slitting a root near the trunk. *Evelyn's Sylva*; as in these cases the ascent of the sap-juice is impeded, and the part below becomes viviparous, or produces new leaf-buds for the reasons mentioned in the last paragraph; as is frequently seen where the end of a branch is lopped, or beneath the scar of the junction of an ingrafted scion.... On the same account it is not uncommon to ingraft with success on roots taken out of the ground, and afterwards replanted; as the robinia on the root of acacia, and any other apples on the roots of the suckers of bur-apple, or codling. See *Phytologia*, Sect. IX. 3. 5.

"For the same reason the roots of some plants, which are otherwise not easily propagated, will shoot up buds; if a part of them next the stem of the plant be half cut through, or raised out of the ground, and exposed to the air; as in pyramidal campanula, and geranium lobatum. And for the same reason the lateral branches of numerous shrubs, as well as of herbaceous plants, will put forth roots, when they are bent down into the ground, if they are previously wounded to prevent the free supply of the vegetable nutriment in its usual course, as in laying carnations, dianthus.

"A method of converting the viviparous branches of pear and apple trees into oviparous branches is described by Mr. Fitzgerald in the *Philosophical Transactions*, vol. lii. and seems to be superior to the exsection of a cylinder of the bark above mentioned; as the alburnum is not left naked after the operation. In the month of August, he made a circular incision round the principal branches of several pear-trees, apple-trees, plumb-trees, and cherry-trees, near the stems of each, through the bark.

About 3 or 4 inches higher, he then made another incision round the bark, and then a perpendicular one, joining these two circular ones, and separated the cylinder of bark nicely from the wood, covering it, and the bare part of the wood from the air, for about a quarter of an hour, when the wound began to bleed. He then replaced the bark with great exactness, and bound it round rather tightly with bass, so as to cover the wound entirely, and half an inch above and below the circumcisions.

"In about a month the bark began to swell above and below the bandages, he then unbound them, and found the parts quite healed. He rebound them slightly with bass, and let them remain so till the beginning of the next summer, when he again took off the bandages and found them all healthy, and every one of them bore plentifully that season, though it was in general reckoned a scarce fruit year.

"He treated two young pear-trees in this manner, which never had yet had any bloom; on one of them he operated on the main arms, and on several of the less branches from those main arms; and on only one of the main arms of the other. The first, he says, bore a surprising quantity of fruit in the next summer; and the circumcised arm of the other bore a moderate quantity; though no other part of the tree had any appearance of bloom.

"Mr. FITZGERALD afterwards took a cylinder of the bark from the branches of two young apple-trees about the same size, as exactly as he could, by measure; and changing them, bound them each on the other tree. The bark of one had a leaf-bud and two apples growing on it; the barks of both of them healed perfectly, the leaf-bud put forth leaves, and the apples remained on and ripened; and both the branches bore so plentifully, that one broke with its load, and it was necessary to prop the other.

"Mr. FITZGERALD further observes, that he changed cylinders of the bark with equal success of nectarine and peach-trees; and that the branches thus operated upon were retarded in their general growth; which coincides with the idea of repeatedly grafting one scion above another on the apple-trees designed for dwarfs to be set in garden pots, as described in No. 2. 2. of this section.

"4. *The transplanting a viviparous fruit-tree, or destroying some of its roots before Midsummer, or the confining its roots in a garden pot, or on a floor of bricks beneath the soil, will induce it to become oviparous.*

"Mr. KNIGHT, in his treatise on the culture of the apple and pear, p. 83, has the following passage: "In the garden culture of the apple, where the trees are retained as dwarfs or espaliers, the more vigorously growing kinds are often rendered unproductive by the excessive, though necessary, use of the pruning knife. I have always succeeded in making trees of this kind fruitful, by digging them up, and replacing them with some fresh mould in the same situation. The too great luxuriance of growth is checked, and a disposition to bear is in consequence brought on." The same observation was made by Mr. LAWRENCE, who took up trees which were too vigorous; that is, which produced viviparous buds instead of ovipa-

rous ones, and replanted them to render them fruitful. *Art of Gardening.* Lond. 1723.

" In transplanting trees for any purpose, it may be observed, *that they should not be replanted deep in the soil*, since the most nutritive or salubrious parts of the earth are those within the reach of the sun's warmth, of the descending moisture, and of the oxygen of the atmosphere. And as the root-fibres of trees, like those of seeds, always grow towards the moistest part of the soil, as the young shoots and leaves grow towards the purest air and brightest light; it follows, that the root-fibres seldom rise higher in the ground than they were originally set, and seldom elongate themselves even perfectly horizontally; so that when a fruit-tree is planted too deep in the earth, it seldom grows with healthy vigour, either in respect to its leaf-buds or its flower-buds.

" This curious effect cannot be produced by generally debilitating the tree from its want of due nourishment; because it is said to succeed best in very good soil, or by the addition of new garden mould, as before directed; but by rendering more difficult the production of radicles from the caudexes of the embryon leaf-buds; which descend to the finest ramifications of the old roots, and elongate themselves beyond the extremities of their ultimate fibrils; a great number of which roots being torn off by transplantation, or compressed in a garden pot, the production or progress of many of the new radicles must be impeded or prevented; and the numerous caudexes of new leaf-buds be in consequence formed with greater difficulty, whence an increased tendency to generate flower-buds.

" For the same reason if beans, *vicia faba*, which are but a few inches high, be transplanted; they do not become so tall, but they flower and ripen their seeds sooner; because they cannot so easily generate new leaf-buds. The same occurs in frequently transplanting brocoli, *brassica;* the plant does not grow so tall, but has earlier flowers, and in greater number; and it is hence better to pluck them up, than to dig them up, for the purpose of replanting them; as by that means more of the root-fibres are torn off, and the plants become almost totally oviparous.

" It is well known, that the vessels of animal bodies are less liable to bleed, when they are torn asunder, than when they are cut with a sharp instrument; as their diameters are contracted, or their internal surfaces brought into contact with each other, in the act of extending them, till they break.... Thus if the naval-string of new born animals are cut instead of torn, they are liable to bleed to death; and there is a remarkable case of a miller's servant*, who had his arm and shoulder bone, or scapula, torn off in a windmill without much loss of blood. This is mentioned to shew, that it may also be better to tear up roots, which are transplanted for this purpose, than to dig them up; as they may thence effuse less vegetable blood, and in consequence be less weakened by the operation.

" In transplanting strawberries, many of the roots being torn off, fewer leaf-buds, and consequent wires, are produced from the diffi-

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* See Cheselden's *Anatomy.*

culty, which their embryon caudexes find in producing new radicles over the old ones to supply nutriment to the wires, till they bend down and protrude roots into the ground at their other extremities, whence a greater number of flower-buds are generated ; on this account the roots of strawberries should generally be transplanted, or new ones from the wires should be cultivated, every third or fourth year, to prevent the too luxuriant growth of their wires ; or a similar difficulty of producing wires or leaf-buds may be effected by crowding the roots of strawberries together, as some gardeners recommend ; but I suppose by these means the fruit may become smaller from scarcity of nutriment, though more numerous.

" A floor of bricks, or of stone, extended about two feet deep beneath the roots of wall-trees, has been practised in some gardens from an idea, that the roots shot themselves too deep into some unwholesome stratum of earth ; and it has been observed, that the trees became better fruit-bearers. In some situations it is possible, this might be the cause of the new prolific property of the trees ; but I suspect it has occurred generally from the difficulty opposed to the number and elongation of the root-fibres, and consequently to the generation of the new caudexes of the embryon leaf-buds ; whence a greater production of flower-buds ensued.

" 5. *If the central viviparous branches of a plant be cut away or shortened, the lateral ones will sooner or more completely become oviparous.* 1. There are many very small buds on the lower parts of large branches, which do not seem to grow to maturity, and in consequence produce neither new leaf-buds nor new flower-buds. There are other lateral shoots on many trees, which only push out a few inches, and are called spurs, and which bear fruit the succeeding summer at their extremities. In many other plants the lateral branches are oviparous, except at the extremity, which is terminated with a viviparous bud ; while the central branches continue long to generate only a viviparous progeny, as in *vines* and *melons*.

" The first of these, or the unprolific existence of the buds at the bottom of large branches, may be owing in part to their feeble efforts of pullulation, from the want of sufficient sunshine and ventilation ; and also in part, like the spurs, and other lateral branches, to the difficulty they encounter in producing the embryon caudexes of new leaf-buds along the trunk ; which is already occupied by those of the more vigorous vegetation of the central branches, which possess a great share of sunshine and ventilation.

" But the principal cause, which renders the spurs and lateral branches oviparous, results from the resistance the embryon caudexes of leaf-buds experience by the curvature of the lateral branch, where it joins the trunk, and the consequent coarctation of its vessels, added to the difficulty every lateral bud has to encounter from its own curvature at its exit from the parent twig ; on which last account the central bud at the extremity of an oviparous branch is generally viviparous, because it has not any curvature at its exit. All this corresponds with the fact above described, that when the viviparous

arms of wall-trees are bent down to the horizon, they become oviparous.

"2. What then happens in all these situations when the central parts are cut away or shortened? First the dwarf-buds at the bottom of these large viviparous branches, which are in part cut away, will find more room to push down the embryon caudexes of new leaf-buds, and will produce a viviparous progeny; and those at the bottom of oviparous branches, which are shortened by cutting off their viviparous extremities, will also now pullulate, and produce flower-buds for the succeeding year, owing to the derivation of some of that nourishment to them, which would otherwise have been expended on the summit-bud. Secondly, the spurs will generate an oviparous progeny, but will require more nutriment, because all the vessels of plants inosculate, and will thence produce larger fruit, and more certainly ripen it. Thirdly, the other lateral branches will receive more nourishment, and become more vertical, and will thence find less opposition to the production of the caudexes, both of the flower-buds and leaf-buds; either of which may become stronger or more numerous according to the greater or less inclination of the branches to the horizon; and both of them may be more vigorous, properly speaking; that is, they may become larger leaf-buds, or larger flower-buds, than others of the same tree.

"3. Thus in the management of MELONS, which would grow into branches much too extensive for the artificial glass-frames of our climate, and would not have time to ripen their later fruit in our short summers; it is necessary first to check the vigour, properly so speaking, of the whole plant.... This is done by washing the seed from the ripe fruit, which should naturally contribute to nourish it; and keeping the seed four or five years, that the mucilaginous nutriment deposited in the cotyledons may also be in some degree impaired; it is also probable, that confining the roots of melons and cucumbers in garden pots, if they were well supplied with nutriment, warmth, and water, might be advantageous for this purpose.

"Secondly, as soon as the leaf appears an inch in diameter, experienced gardeners pick out the central bud, which causes an oviparous, though a more vigorous, lateral shoot; which, therefore sooner bears fruit, and that of a larger kind; as it acquires more nourishment from the destruction of the central one.

"And as these lateral branches are liable to produce other viviparous shoots at their extremities, after they have generated lateral flower-buds, it again becomes necessary to pinch off the viviparous extremities of them, not only to accommodate them to the size of the glass-frame, but also to supply them with more nutriment, which would otherwise have been expended on the viviparous summit.

"The central bud, or summit, of the lateral branches, is generally viviparous, as well as of the central branches; because the embryon caudexes of its new offspring are opposed in the production along the bark by only one curvature at the insertion of the branch into the trunk; whereas the lateral buds of the lateral branches have the progress of the embryon caudexes of

their new buds opposed by two curvatures, one of the bud to the branch, and another from the branch to the trunk.

" The lateral branches of many mature trees, though they bear flower-buds on their sides, are generally terminated with a leaf-bud, as above explained; but it happens in some of them, and particularly to vines, that after two or three flower-buds are produced on a lateral branch, that it shall proceed to grow in length, and to produce leaf-buds at every joint above the flower-buds, as well as at the summit; which may be thus perhaps satisfactorily explained. After the third, and fourth, and fifth joints of a new lateral shoot have generated flowers, which require few or no more caudexes; room enough is left on the bark of the shoot for those above them to acquire the numerous new miniature caudexes of embryon leaf-buds, and where the new caudexes of embryon buds can easily be produced along the bark, and sufficient nutriment is supplied; all vegetables are more liable to propagate themselves by buds than by seeds.

" II. *To Perfect and Enlarge the Fruit.*

" It is believed by some of the Linnæan school, that flower-buds or leaf-buds may be converted into each other in the early state of their existence, as mentioned in *Phytologia*, Sect. IX. 2. 8. It is indeed probable that either a flower-bud or leaf-bud may be generated instead of each other reciprocally, before either of them exists; but after either of them has obtained a certain degree of maturity, so as to be distinguished by its form being more pointed or more spherical; I suspect no addition or detraction of nutriment, or of the facility of the production of its embryon caudexes down the bark and radicles beneath can change its destination.

" 1. *Shorten the oviparous branches, when the leaves fall off, by pruning their viviparous summits, and cut away the root-ruckers.* The summits of the lateral branches as well as the erect ones, are furnished generally with viviparous buds; which in many wall-trees should be cut off, after the leaves fall in autumn; that more nutriment may be derived to the fruit-buds, which may occasionally become somewhat enlarged during the milder days of winter; as they are now certainly too far advanced to be changed into leaf-buds; and if this pruning be deferred till late in the winter months, the flower-buds will not be quite so forward, as if it be performed earlier. For the same reason the root-suckers also should be cut away in the autumn, that all the nutriment, which they would otherwise expend, may be derived to the flower-buds, and induce them early to enlarge themselves.

" 2. *Pinch or rub off all useless viviparous buds in the spring or summer, as they occur.* In those trees where the fruit-buds arise on the new leaf-shoots along with the leaf-buds, and cannot therefore be sooner distinguished or approached, as in figs and vines, the summit leaf-buds should be pinched off two joints above the fruit-buds, as soon as they appear, that more nutriment may be conveyed to the fruit-buds.

" And in the hardier wall-trees, the new leaf-buds, which appear during the spring and summer months in wrong places, where they cannot be trained properly

against the wall, or where they are too numerous, should be rubbed or pinched off, as they occur; whence more nourishment will be derived to the ripening fruit, and to those new leaf-buds which are to remain to produce future flower-buds.

" And if the new buds, which are seen in their young state in the axilla of the leaves of the new shoots, were picked out by the point of a knife, or pinched off, where they grow long enough for that purpose, as the secondary shoots of vines in grape houses are pinched; it might probably induce those eyes to produce flowers in the succeeding year, as spoken of in *Phytologia*, No. 2. 5. of this Section, as well as contribute to enlarge the present fruit by the expenditure of less nutriment on the leaf-buds, an idea well deserving the test of experiment.

" In the same manner, in the cultivation of melons and cucumbers, after the central bud is pinched off, as mentioned above *Phytologia*, No. 2. 5. the viviparous extremities of the lateral branches should be also destroyed, as soon as a sufficient number of female flowers are impregnated; that a greater share of nutriment may be derived to them, instead of crowding the frame with new branches, whose fruit-buds would be too late to ripen in our short summers.

" 3. *Thin all those fruits, which are too numerous; pluck off apricots, peaches, gooseberries; and cut out many grapes from each branch with scissars.* By the inosculation of the vessels of vegetables, when any parts of a tree are destroyed, those in their vicinity become more vigorous. On this account, when part of the fruit is taken away as early as may be, the remaining part acquires more nutriment..... Add to this, that where the fruit is crowded, some of it becomes precluded from the sun and air, and in consequence does not perfectly ripen, and is liable to become mouldy; for mucor is a vegetable production, which, like other fungi, does not require either much light or air, as appears from the growth of some fungusses in dark cellars, and of common mushrooms beneath beds of straw.

" 4. *Prevent the production of new leaf-buds.*

" In some pear trees, the whole of the blossoms become steril, and fall off without any apparent injury from cold, and this for many successive years. The same occurs sometimes to chesnut trees, *æsculus pavia*, after the flower the fructification entirely falls off; some of these might be male flowers, as MILLER observes, but the whole could not be such. The same happens very frequently to the fig-trees of this climate, sometimes the whole crop falls off, when they are about the size of filberts; that is, while they are still in flower, which, though concealed within the fig, must precede the swelling of the seed, whether these be impregnated or not.

" A correspondent fact occurred to me a few years ago. I had six young trees of the Ischia fig, with fruit on them, in pots, in a stove. On removing them into larger boxes, the figs fell off, which I ascribed to the increased vigour of the plants, as they protruded very vigorous shoots, occasioned by the accumulation of new soil round their roots. Perhaps these plants might rather be said to have been in flower than in fruit, and perhaps

these flowers were all male ones only, or accompanied only with imperfect female ones?

"Whence I conclude, that about the season when the corals of these flowers with their stamens and stigmas die, the trees generate and nourish too many new leaf-buds, owing to the facility with which they can produce the new caudexes of these young buds down the bark; and that by the whole of the vegetable sap-juice being derived to the new buds for their present growth, or to form reservoirs for their future grown, the pericarp and seeds, whether impregnated or not, are deprived of their due nutriment and fall off.

"Hence I propose to tie waxed thread or fine wire round the twigs of pear trees, which have usually miscarried, as soon as they are in flower, so as to compress, but not so as to strangulate them; or to wound the bark by a circular or semicircular incision, which might counteract their facility of procreating new leaf-buds; which I suspect would be more effectual in preventing the flowers from falling off, than pinching off the new leaf-buds, as they appear; which is recommended by Dr. BRADLEY, in the management of fig-trees, and is done to vines in hot houses; but which I found to be ineffectual on many fig branches, both in the natural ground and in pots, and ascribed its failure to the continuance of the efforts of the fig-tree to produce new leaf-buds; whereas in vines, I suppose, the grapes would ripen, whether the new leaf-buds remain or are destroyed..... See *Phytologia*, No. 3. 2. of this Section.

"PONTEDERA observed, that in the islands of the Archipelago, some fig-trees bear in the spring many male flowers, and few female ones, the former of which fall off; and that they bear a second crop, chiefly of female flowers, in the autumn, which ripen in the ensuing spring....*Anthologia*. Can this occur in the fig-trees of this country?

"Other figs are said not to ripen, but to fall off before their maturity, unless they be wounded by insects in their caprification, or punctured by a straw. A further investigation of this subject is much wanted to propagate figs with success in this climate. See *Botanic Garden*, vol. ii. note on caprificus. See also MILNE's *Botan. Diction.* Article Caprification.

"5 *Give additional moisture, manure, and warmth, during the early part of the growth of fruit....* By additional moisture the fruit becomes larger; in hot houses this may be effected two ways, one by watering the earth on which the vegetables grow, and another by producing steam by watering the warm flues or floors; which will afterwards in the colder hours be again condensed, and settle in the form of dew on the fruit and leaves.

"By supplying vegetables as well as animals with an abundancy of fluid, they are liable to increase in bulk, both because the external cuticle, which confines the growth of both of them, becomes relaxed, as is seen in the hands of those women, who have many hours been employed in washing; and also because the cutaneous absorbent vessels will thus imbibe more fluid from the external surface; and the cellular absorbents will therefore imbibe less from the internal cells, and consequently more mucus or fat will remain in them.

"Thus in Lancashire, where

premiums are given for large gooseberries, I am told, that some of those who are solicitous for the prizes, not only thin the fruit of a gooseberry-tree, so as to leave but two or three gooseberries on a branch, but then by supporting a tea saucer under each of these gooseberries, bathe it for some weeks in so much water as to cover about one fourth part of it, which they call suckling the gooseberry.

"There are two circumstances to be attended to in giving water to plants; which are, not to water them during the hot part of the day in summer, nor in the evenings of spring, when a frost may be expected; in both these circumstances we may be said to copy nature, as rain is generally preceded by a cloudy sky, and is never accompanied by frost; though that sometimes follows it, and is then very injurious to vegetation.

"When plants have been long stimulated by a hot sunshine into violent action, if this stimulus of heat be too greatly and too suddenly diminished by the affusion of cold water, or by its sudden evaporation, their vessels cease to act, and death ensues; exactly as has too frequently happened to those, who have bathed in a cold spring of water after having been heated by violent and continued exercise on a hot day. When severe frosts follow the watering of plants, they are rendered torpid, and die by the too great and sudden diminution of the stimulus of heat; which is equally necessary to the activity of vegetable as to animal fibres; and in some instances the circulation of their fluids may be stopped by the congelation of them; and in others their vessels may be burst by the expansion attending the conversion of water into ice; or, lastly, by the separation of their different fluids by congelation.

"When an addition of manure can be procured, as where the black carbonic juice from a dunghill mixed with water, or soapsuds, which have been used in washing, can be employed instead of water alone, it must undoubtedly add to the nutriment, and consequently enlarge the size of the fruit by that means also, as well as by the additional water.

"6. *Protect the early flowers and the late fruits from frost.* The vernal frosts are very pernicious to the early blossoms of apples and pears, and of all the tender wall-trees; various contrivances have been used to shelter them, as mats suspended before wall-trees; which in Denmark are said to be used to shelter them from the mid-day sun, as well as from the night frosts, both to prevent them from flowering too early, and being thence exposed to severe frosts; and because vegetables suffer more from great cold, as well as animals, after having been exposed to great heat, as explained in *Phytologia*, Sect. XIV. 2. 2.

"Those parts of vegetables, which are most succulent, suffer most from frost, as the young tops of tender trees, as of the ash, *fraxinus*, and weeping willow, *salix babylonica*; and also all other vegetables, after having been exposed to much moisture, as to rain or dews; which probably may occur in part from the greater sensibility of the tender juicy summits of the present year's growth, and partly from the expansion of their frozen juices, which may burst the containing vessel.

"From some experiments in a late volume of the *Philosophical Transactions*, it appears, that very much more rain was caught in glasses placed on the ground near a high church, than was caught in similar glasses on the roof of it; which evinces, that a much greater quantity of moisture exists in the lower parts of the atmosphere, and is precipitated from it, than from the higher parts; whence to protect the blossoms more effectually from the descending dews coping boards might be placed at every two feet or less above each other, with their front edges pointing upwards to the meridian sun in March, and ledges nailed on the back edges to convey the rain or dews towards the central part of the tree, where by another cross ledge at the end of each board it might be carried from the wall.

"A similar inconvenience from autumnal frosts affects some of the late fruits, as figs and grapes, which might also receive advantage from replacing the coping boards in the autumn.

"Another method of effectually guarding against the vernal frosts, and also the autumnal ones, is by building the garden walls with fire-flues in them, which is now frequently practised. There is one secret necessary to be known, and well attended to, in the management of fire-flues: and that is in the first place to plant trees, which will open their flowers about the same time, against the same flue, and then diligently to observe not to put fire into this flue, till the trees, it is designed to assist, are in flower; since if the fire be applied sooner, the flowers are forwarded, and in consequence exposed to more danger from the severer frosts. One friend of mine, who diligently attends to this circumstance, assures me, that he never fails of producing a plentiful crop of excellent fruit.

"And it is possible that one use of covering apricot trees, before they flower, from the mid-day sun, which is said to be practised in Denmark, may be to protract their time of flowering, and thus expose them to less danger from frost, as well as to prevent their irritability from being exhausted by the heat, and thus causing the night air to be more injurious to them.

"7. *Fruits may be sooner ripened by wounding them, or by gathering them.* The wounds inflicted by insects on many fruits, promotes their more speedy ripening, as well as those inflicted by caprification, mentioned in *Phytologia*, Sect. XIV. 3. 3. and in No. 3. 4. of this Section. It is said that cutting the stalk of a bunch of grapes half through, which has acquired its due size, will expedite the ripening of it; because it will then be supplied with a less quantity of new juices, and the change of its acerb juices into saccharine ones, which is partly a chemical, and partly a vegetable process, proceeds more rapidly. See *Phytologia*, Sect. X. 8. 1. On the same account the pears on a branch, which has had a circle of its bark cut away, will ripen its fruit sooner; and those annual plants, which are supplied with less water than usual, both flower sooner, and ripen their seed sooner.

"To which may be added, that gathering pears from the tree before they are ripe, and laying them on heaps covered with blankets, is known considerably to forward their ripening, by something like a

chemical fermentation added to the living action of the fruit, which advances the saccharine process with greater rapidity.

"I have seen apricots at table, which I was informed were plucked from the tree, and kept some days in a hot house, and thus became deliciously ripe; in the same manner as harsh pears ripen almost into a syrup during twelve or twenty hours baking in a slow oven; which occasioned the jest of a French traveller, who on being asked on his return, what good fruit they had in England, answered, that the only ripe fruit he happened to taste was the baked pear.

"IV. THE ARTS OF PRESERVING FRUIT, as they depend on the prevention of the chemical processes, which produce their dissolution, ought to be here mentioned.

"1. As life, whether animal or vegetable, prevents putrefaction, and as many fruits exist long after they are gathered from the tree, before they become ripe and die spontaneously, and in consequence putrefy, as crabs, sloes, medlars, and austere pears. The art of preserving these consists in storing them, where the heat is neither much above or below 48 degrees, which is the temperature of the interior parts of the earth; that is, in a dry cellar, or beneath the soil, or well covered with straw or mats in a dry chamber. As greater heat might make them ripen sooner than they are wanted, by the increased activity of their vegetable life; and frost by destroying that life would subject them to putrefy, when they become thawed; as perpetually happens to apples and potatoes, which are not well defended from frost. And lastly, the moisture would injure them many ways; first, by its contributing to destroy their vegetable life; secondly, in promoting the chemical process of putrefaction; and thirdly, by its encouraging the growth of mucor or mould, which will grow in most situations without much light or air.

"Too great warmth destroys both animal and vegetable life, by stimulating their vessels into too great activity for a time, whence a subsequent torpor from the too great previous expenditure of the living power which terminates in death. After the death of the organization, a boiling heat coagulates the mucilaginous fluids, and if continued would, I believe, prevent the chemical fermentation of them; and that thus both vegetable and animal substances might be preserved. The experiment is difficult to try, and could not therefore be of much practical utility if it should succeed.

"Great cold on the contrary destroys both animals and vegetables by the torpor occasioned by the defect of stimulus, and a consequent temporary death. Afterwards if a great degree of cold be continued, in some cases, the expansion of their freezing juices may burst the vegetable vessels, and thus render the life of them irrecoverable. But there is another curious thing happens to many aqueous solutions, or diffusions, which is, that at the time of congelation the dissolved or diffused particles are pushed from the ice, either to the centre, if the cold be applied equally on all sides, or into various cells, as mentioned in *Phytologia*, Sect. XIII. 2. 2.

"This exclusion of salt is seen in freezing any saline solution in

water; as common salt or blue vitriol exposed to severe frost in a two ounce phial. are driven to the centre of it. Wine, vinegar, and even milk, may be thus deprived of much of their water. Very moist clay, when exposed to frosty air, shrinks and becomes much more solid according to the assertion of Mr. KIRWAN....*Mineralog.* vol. i. p. 9, the freezing water covering its surface with ice, and driving the molecules of clay nearer the centre. And lastly, the mucilage produced by boiling wheat-flour in water, like book-binder's paste, if not too thick loses its cohesion by being frozen, the water driving, as it freezes, the starch from its crystallization; and from this circumstance probably is occasioned the change of flavour of apples, potatoes, and other vegetables, on being thawed after they have been frozen.

" It is nevertheless affirmed, I think, by Mons. REAUMEUR, that if frozen apples be dipped in cold water repeatedly, and the ice thus formed on their surface wiped off, or if they be left in a large pail full of very cold water, so that they may not thaw too hastily, they will not lose their flavour. If this be true and the apples will keep sound some time afterwards, it would seem that the vegetable life was not destroyed; but that, like sleeping insects, they were reanimated by the warmth; otherwise, if the flavour be not destroyed, and they could be immediately eaten, or used in cookery, it is still a valuable discovery, if true, and might lead us to preserve variety of fruits in ice-houses, as strawberries, currants, grapes, and pines, to the great advantage of society....See *Phytologia*, Sect. XVII. 2. 4.

"As the process of fermentation will not commence or continue, I believe, in the heat of boiling water, or 212: and as this degree of heat can be easily preserved by steam, or by the vicinity of vessels containing boiling-water it is probable, that fruits for the use of cookery might be thus preserved throughout the year, as the pulp of boiled apples, gooseberries, &c. put into bottles, and placed so as to be exposed to the wasted steam of steam-engines, or immersed in the hot water, which flows from the condensing of it; or near the boilers fixed behind some kitchen fires; as I suspect, that if such a degree of heat could be applied once a day, it would counteract the tendency to fermentation.

" 2. Another method of preserving some fruits is by gathering them during their acid state, before that acid juice is converted into sugar, as lemons, oranges, gooseberries, pears, and some apples; and if a part of the water be evaporated by a boiling heat, so as to leave the acidity more concentrated, it is less liable to ferment, and in consequence will be longer preserved. For this purpose the fruit should be kept in a cellar, and corked in bottles, so as to be precluded from the changes of air, and variations of heat; gooseberries, and rhubarb-stalks, are thus successfully preserved for winter use; and if a tea-spoonful of brandy be put into each quart bottle, it will prevent the growth of mucor or mould upon them.

" 3. As sugar will not pass into fermentation unless diluted with much water, and less so in low degrees of heat, many fruits may be thus preserved by impregnating them with sugar, and the better if

they are kept in a dry cellar. Dr. Hales found that by inverting the end of a branch of a tree into a bottle of brandy for a few hours, the whole branch died; hence it is usual and useful to cover preserved fruits with a paper moistened with vinous spirit, which prevents the growth of mucor or mould upon their surfaces, which is a vegetable thus easily killed by the intoxicating stimulus.

"If sweet fruits be dried by heat, not only the superfluous water becomes exhaled, but the saccharine process is also promoted, and much of the mucilaginous or acid particles are converted into sugar, as in baking pears, or in drying figs, dates, raisins, apricots: so that by gradually drying them, many fruits may be well preserved, and require afterwards simply to be kept dry.

"4. Some fruits, as the olive, are preserved in their unripe state in salt and water; the unripe pods of kidney-beans, and the hats of mushrooms, may be thus also kept for months in weak brine in a cool cellar enclosed in bottles without much change. But the oily kernels of nuts are well preserved in cellars beneath the soil, to preclude the variations of heat, and covered in jars to prevent their evaporation. Other fruits are converted into pickles and preserved in vinegar, but lose their flavour; and others by being immersed in vinous spirit are preserved, as cherries, and thus transmuted from food to poison. And when the kernels of apricots, cherries, or bitter almonds are preserved in brandy, which is called ratafia, we possess a mixture of two of the most poisonous productions of the vegetable kingdom; except perhaps the leaves of laurocerasus distilled in alcohol, which was sold as ratafia in Dublin, and produced many sudden deaths in the gin-shops."

In planting fruit trees, the holes ought to be dug at least one foot larger every way than the roots extend, some rich earth thrown into the holes, and the whole well pulverized; the first tender shoots from the roots passing into the earth thus enriched and made soft, will have a quick and strong growth and thereby penetrate the more solid earth with vigour. But if the soil be a stiff clay, the ground round the tree ought to be dug and manured every year, farther and farther from the tree, to make way for the extending roots. Neither grass nor weeds should grow near trees to rob them of their nourishment.

When newly grafted scions on young stocks are designed to remain a few years in the nursery, before they are intended for sale, some provident gardeners transplant them, every two years, that the root fibres may be more numerous in a small compass, which oscasions them to grow, when finally transplanted, with more certainty and with greater vigour.

The following mode of transplanting fruit trees, as well as other kinds, has been successfully practised by a nursery man:

Late in autumn, dig round the root of a tree, about three feet from the body, and leave the trench open; it will fill with water and freeze all the earth around the roots. Early in the spring, remove the tree, having dug it up with all the earth adhering to the roots, and insert it into the hole made to receive it. This hole should be larger than the roots of the tree require at first. In severe winters the above mode might answer, but

during a moderate season, there would be danger of the destruction of the tree from the roots being constantly covered with water.

Manuring the roots of fruit-trees is of the greatest importance for the preservation of the fruit. It is said that the *Agricultural Society of Nova-Scotia* has found by experiment. that apple trees raised from the pummice, if transplanted in time, (having the end of the tap root cut off.) may be rendered fit for grafting one or two seasons earlier, than if left in the place where the seeds were sown.

In an excellent paper on the climate of the United States, inserted in the *London Monthly Magazine* for January, 1800, by Col. TATHAM, are the following remarks, which are well worth attention :

" It is a fact. that in those western parts of the United States, which have an high exposure to the winter's blast, the northern sides of a ridge or mountain arrive sooner and more certainly at a state of perfect vegetation, than the south sides, which are laid open to the power of the sun. I account for this phenomenon as follows : I suppose, that the southern exposure to the vehement rays of the sun, during the infant stages of vegetation, puts the sap in motion at too early a period of the spring, before the season has become sufficiently steady to afford nurture and protection to the vegetating plant, blossom, or leaf; and when in this state, the first efforts of vegetation are checked by the chilling influence of cold nights, and such changeable weather as the contest between winter and spring is ever wont to produce, in their apparent struggles to govern the season.... On the contrary, the northern exposures which are not so early presented to the vivifying influence of the sun remain, as it were, in a torpid state, until the more advanced period of the spring, when all danger of vegetation being checked is over. Mr. C. YANCEY, of Amherst county, Virginia, who was remarkable for the management of his peaches, had his orchard on the north side of a lofty mountain."

Col. T. further observes, " that during a hard winter, he saw a particular tree in a row of the same kind and growth preserved through the mere accident of its having been paved with oyster shells...... Upon this principle, Mr. WYTHE, of Virginia, succeeded in an experiment of planting a young orchard in the usual mode, and securing each tree respectively, by passing them through the eyes of grind-stones, and breaking them by a sledge hammer, so soon as the maturity of the tree required a greater space for its expansion."

Mr. JOSEPH COOPER informed the Editor, that early and late apples, by being ingrafted on the same tree, improved in flavour, more than if but one kind grew on a tree. Mr. SAMUEL COLES, who was present, confirmed the fact; and said, that the Harvest-apple, and Newton-pippin, grew in his orchard on the same tree, and that both were larger, and of a finer flavour, than any other apples of the same kind in his collection; though the soil, exposure, and all circumstances, were precisely the same.

Fruit has been hitherto little attended to in the state of Pennsylvania. It is true, we have had, and still have several fine kinds, particularly of apples; but considering

how very well they thrive in every part of the state, it cannot be said that they abound to a degree that might be expected. The greatest neglect has prevailed in respect to proper trimming and manuring round the roots of the trees, and but little attention has been paid to the perpetuation of a fine species, by grafting from it on other stocks. In Boston, and New-York, the superiority of the fruit has been always remarked. The family of PRINCE, at Flushing, Long-Island, has been many years celebrated for their fine fruit, and some of the choicest kinds to be met with in various parts of the United Stases, have been brought from their nursery. A very extensive and excellent collection of fruits, both imported and native, was originally commenced about ten years since, by Wm. COXE, Esq. of Burlington, New-Jersey, and is now for sale by J. SMITH & Co. at that place. In this grand collection, there are eighty kinds of apples, *ninety* kinds of pears, and *fifty-one* of cherries, nearly all imported, and ONE HUNDRED varieties of peaches. Mr. SAMUEL COLES, of Moor's-Town, New-Jersey, also has an excellent collection.

Several French gentlemen, who have taken up their residence near Philadelphia, have done much in a few years towards improving our stock of fruits, by importing largely of the finest kinds from France, and there can be no doubt, if we take pains to propagate from the valuable stock in our power, that in a few years the neighbourhood of Philadelphia may boast of as fine a collection as can be desired.

Under the article APPLE, some important remarks were given on this subject; the Editor has now great pleasure in presenting to the American public the first attempt ever made to collect into one view, a list of the finest kinds of apples growing in the United States. For the materials of which this list was composed, he has been indebted to Mr. Wm. PRINCE, of Long-Island, Mr. R. RILEY, of Marcus-Hook, Chester county, Pennsyl. Wm. COXE, Esq. of Burlington, and the Hon. Judge BOUDINOT, of Newark, New-Jersey, through whom also the valuable facts from Mr. JOHN OGDEN, of Newark, and from Mr. ASA HILLYES, of Orange, Essex county, New-Jersey, were obtained; and he, with thanks, expresses his obligation to them for their ready assistance and communications. Attentive, however, as his friends have been, he cannot suppose that the list comprehends every apple in the United States; but he is satisfied that the most valuable have been described, and he will gladly receive accounts of any others which may have been unnoticed, and add them to the list, should another edition of this work be called for.

The following kinds of apples are most commonly cultivated at present in the United States. Those marked P are in the sale catalogue of Mr. Prince, of Flushing, in Long-Island:

1. *The Juneting*, P. is one of the earliest apples, it ripens in June, and is of a yellow colour and small size.

2. *Large early Harvest*. P. Ripens in June and July. It is usually as large as a middle sized Newton pippin, of a pale yellow colour when ripe, of a pleasant acid taste, and answers best for tarts, and may be used for that purpose

when no larger than a nutmeg, by cutting them in two equal parts without peeling.

3. *Bow-apple*, P. Ripens in June and July, equal to any summer apple; it is juicy, tender, and mild, of a light yellow colour.

4. *Woolman's Harvest*. Ripens in July. A handsome and striped apple; agreeable to the taste.

5. *Sweet's Harvest*. Ripens in July, with red streaks, very fine for eating, or for tarts.

6. *Summer Blush*. Ripens in July and August, a very pleasant apple.

7. *Summer Queen*. Ripens in July and August, white with red streaks. This apple is much admired for the table in Delaware state.

8. *Sheep's Snout*. An admired summer fruit.

9. *Large red and Green sweeting*. P. Ripens in August. A very large fruit weighing a pound. This is said to be the same as the Bow-apple, No. 3.

10. *Summer Pearmain*. P. Ripens in August and September. An excellent apple.

11. *Autumn Pearmain*. P. Ripens in September and October.

12. *Sweet Pearmain*. Ripens in September and October.

13. *Large white sweeting*. P. Ripens in September.

14. *White's Pearmain*. Ripens in August, is of a very agreeable taste.

15. *Edward's Early*. Ripens in August.

16. *Autumn or Fall Pippin*. P. Ripens in October. A large yellow apple, acid taste and pleasant flavour. It is also a good kitchen apple; it usually weighs 19 oz.... Keeps well.

17. *Golden Pippin*. P. Keeps from October to January. Slightly acid: yellow on one side, and red on the other; it is a good apple according to Mr. RILEY, and was brought from England by WM. PENN.

18. *Newton Pippin*. P. It is of a flattish form, and green colour, when first gathered, turning yellow in the spring, and is justly esteemed the best table apple in America. It is supposed to have come originally from Holland, "*POPPYNJE*" in low Dutch signifying *a small sharp apple*; but Mr. PRINCE says it originated in the town of Newton, Queens County, Long Island, state of New-York. In general, apples kept till the spring lose their flavour and become mealy, but the Newton pippin may be kept till June without losing either its juice or flavour. It is an excellent apple for cyder, either alone or mixed with others. Many varieties are raised from the seed of it, of a large size, but different in form and colour. Mr. RILEY, of Marcus Hook, says, there are two varieties raised at Newton in Chester County. The flat sort is much the best, and the greatest bearer. It is an excellent apple for house use, makes a large quantity of cyder, though of a thin quality. A large long kind sometimes called Lady-finger, is not so good, the taste is not so pleasant, and it has a thick skin. This apple is of a beautiful golden colour in the spring. The trees of both those varieties grow larger, and are great bearers. FORSYTH remarks that the Newton pippin seldom ripens in England. Mr. COOPER of N. Jersey, remarks, that the Newton pippin does not thrive in a sandy soil.

19. *Newark Pippin, (of Prince) yellow Pippin, French Pippin of Newark.* Abounds near Newark, New-Jersey; an excellent winter apple of a greenish colour outside, rich saccharine taste, yellow substance, and of a higher flavour than the Newton pippin. It is so abundant in juice, that a barrel of cyder has been made from seven bushels, but the cyder is not of the first quality. It is said to have been imported from France.

20. *American Pippin was brought* from Maryland to Marcus Hook, thirty years since. It is of a flattish form, middle size, firm substance, resembling the *Vandevere:* and will keep till harvest. Mr. Coxe describes it as a large long fruit, having a dull *red stripe.* Fourteen bushels of these apples are required at Marcus Hook, to make one barrel of cyder.

21. *Spitszenburgh.* P. " Keeps from November to March. There are three sorts. The Æsopus, Flushing and the Newton. The first is of a light red colour, round form, and pleasant flavour, and slightly acid. The second is generally larger and of a deeper red colour, covered with small white specks; its form is flatter and is of a more acid taste than the first. The third species resembles the second in taste and colour, but in form is much flatter."

According to Mr. S. De Witt, surveyor general of New-York, " the Spitszenburgh apple was discovered as an accidental production in the neighbourhood of the city of Albany, and in his opinion may challenge the world to match it. The flavour he thinks superior to the Newton Pippin. Mr. Cooper and Mr. Coles of Moorestown mentioned another kind called the Cane Spitszenberg, from a family of that name near Gloucester point New-Jersey, and which they thought superior to the kinds mentioned above.

22. *The Rhode-Island Greening.* P. Is a most excellent apple. It is a large fruit, of a green colour when first gathered, and turns yellow toward spring, and of a very fine flavour. It answers well for culinary purposes. The tree is of a very rapid growth.

23. *Jersey Greening.* P. Keeps from November to March. It is a more juicy apple than the Rhode-Island Greening: but does not keep so well, of a pleasant flavour, light green colour, covered with small red spots.

24. Monstrous Pippin, or *American Gloria Mundi*, P. " will keep from November to March. It originated on the farm of Mr. Crooks, near Red-hook, New-York. It is of a yellow colour when ripe, and resembles in flavour the fall pippin, or piplin. The fruit of the original tree weighed 27 ounces."

25. *American Nonpareil, or Doctor Apple, in Pennsylvania*, P. " will keep from November to March. A large red-striped apple, of excellent flavour, and very juicy. It keeps tolerably well during winter:" The tree is subject to blast.

26. *Swaar Apple*, P. " keeps from November to March. A large yellow and greenish apple, of good flavour much admired," but liable to be injured by the rose bug, when the fruit is young. The trees bear well.

27. *Lady Finger*, P. A long tapering fruit, of a beautiful yellow and red colour: it is well flavoured, and keeps till June.

28. *Red Everlasting*, P. Ripe in

November; its colour deep red: it is a small sized fruit, of tolerable flavour; and keeps well till June or July, but grows mealy and dry.

29. *Yellow Bell Flower*, P. "A long yellow apple, of good flavour, and will keep until March."

30. *Green Everlasting*, P. Light green colour; skin remarkably smooth and fair. This apple keeps well until late in the summer, and some have been kept perfectly sound more than a year from the time they were gathered.

31. *Michael Henry*. A winter fruit, a long green apple, much admired for the table in Monmouth county, New-Jersey. It is a sweet, juicy, sprightly, and well flavoured apple.

32. *Redling*. Was brought about sixty years since from Pennsylvania to New-Jersey, by the mother of Mr. Joseph Cooper, who thinks it the best keeping apple now known. The colour is of a light shining red, and of very pleasant smell and taste. They hang on well, being suspended at the end of the twig. It somewhat resembles the Priestley apple. The Ridley, or Rigley apple, which abounds in Plymouth township, Philadelphia county, approaches very much to the Redling in colour and taste. Are they the same?

33. *Sweet and Sour*. This singular fruit came from Benjamin Clarke, of Milstone, N. Jersey, It is full of inequalities. The prominences are of one taste, and the cavities of another.

34. *Orange Apple*. Ripe in November, much admired in Huntingdon county, New-Jersey.

35. *Black Apple*. Ripe in Nov. a very deep red. Another much admired fruit near Trenton, New-Jersey.

Mr. Boudinot, of New-Jersey, says, "There is an apple lately discovered here, which is called by the owner of the orchard, a *black apple*; but it is much larger, finer, and somewhat different from the common black apple. It appears to be a species between the Spitszenburgh and common black apple."

36. *Morgan Apple*, Ripe in Oct. so named by Samuel Coles, of Moorstown, New-Jersey; as it come from the late J. Morgan, of Pensockin, New-Jersey. A pleasant eating apple; will keep till May. A great bearer.

37. *Summer Pippin*. From Dr. Campfield, of Morris county, N. Jersey.

38. *Lambert Apple*. From Hunterdon.

39. *Red Winter*. Much praised by Samuel Coles, of Moore's-town, New-Jersey.

40. *Burlington Pearmain*. Originally from England.

41. *Ruckman's Pearmain*, P. Ripe in autumn.

42. *White Pippin*, P. Keeps from November till March.

43. *Quince Apple*, P. Keeps from November till March.

44. *Priestley*. Keeps from December to April; originally cultivated in Bucks county, Pennsylvania. A large, long, juicy fruit, and of a spicy flavour; colour red. This tree grows very straight, and is of a handsome shape.

45. *Van de Vere*. Formerly called Stalcubs. A well known and most excellent eating fruit; pleasant, and sprightly acid, joined with a sweetish taste, and much preferred for pies and sauces. Unfortunately the trees have greatly failed of late. On a rich heavy soil

they are subject to the bitter rot, on light soil not so much so. Mr. RILEY, of Marcus Hook, says, this apple originally came from Wilmington, Delaware, and was called after a farmer who raised it.

46. *Merett's Pearmain.* An early autumn fruit, cultivated in Bristol, Pennsylvania; a light red, pear-shaped fruit, lively taste, but will not keep; it makes excellent cyder.

47. *Large Piplin.* Weighs one pound.

48. *Pennock's Red Winter.* A large, fair, pleasant, spicy apple; of an oval and somewhat flat form; of a reddish colour. It originally came from JOSEPH PENNOCK, of Springfield township, Delaware county; is ripe in September, and makes but poor cyder, and will not keep well. The tree is large, and bears abundantly every other year.

49. *Winter Sweeting.*

50. *Brown Winter.*

51. *Roman Stem.* From Burlington: a good eating apple, slightly acid; of a dull green, not handsome shape.

52. *Spice Apple*, is a large autumn apple, of an aromatic flavour; very tender, and good for house use, but will not keep long. It appears to be peculiar to Newark, New-Jersey.

53. *Rambo.* From Delaware; a fine fall apple, of the size of a Vandevere; same shape.

54. *Winter Queen. Forsyth* No. 44. From Delaware.

55. *Hays Winter. Forsyth* 43. From Delaware; a fall apple of the Vandevere taste, and next in quality for baking to that fruit.

56. *King Apple*, is a very large red fruit, ripens in October, and when mellow has a pleasant taste, and is generally used as a winter apple about Newark, New-Jersey; though it does not keep so well as some others.

57. The *Nursery Apple*, is the size of the Harrison apple. When first ripe, it is of a greenish colour, but in the latter part of the winter it turns yellow; it is frequently kept until June and July, and has been kept sound until September. It originated in a nursery of Jos. BALDWIN, at Crane-town, N. Jersey.

58. *Burlington Spitszbergen.* A winter apple.

59. *Lady Apple, Nonpareil, Pomme d'Apis*, P. of French origin; is of a bright red colour next the sun, and yellow and green on the other side. A most beautiful little apple, and of pleasant taste.

60. *Newark Gate Apple.* Native of New-York; sprightly acid taste, and good for culinary use and cyder.

61. *Brown Knight.* In Mr. Riley's opinion, this is excelled by none for the table. It is ripe in Sep. and keeps well. It was discovered by Rowson, an old Swede, near Marcus Hook.

60. *Queen Apple.* A large, fair, and well known apple; fit for use the latter end of July, or sooner; bears well every other year; a very good apple, but makes poor cyder. This, with the American pippin, and Brown Knight, will furnish the house with fresh apples all the year round.

CYDER APPLES.

1. *Hughes' Virginia Crab.* A small fruit, of a light green colour, striped with red, and of a harsh unpleasant taste. The Virginia Crab used for preserving is a different fruit, and has the disagreeable astringent flavour of a green medlar. Both of these originated in the state of Virginia.

2. *Cooper's Russeting.* Keeps from October to May. A natural fruit produced on the farm of Jos. Cooper, of New-Jersey, who believes it to be of Indian origin, as the tree from which he (when a young man) preserved a graft, was an old decayed tree, and the place on which it grew was originally the site of an Indian village. It is somewhat dry, but of a pleasant sweetish taste. This apple makes most excellent cyder: it also is a good pye apple, and best when not pared. Pears boiled in Russeting cyder, with about half sugar, make a good preserve. The trees bear abundantly every second year..... The limbs spread horizontally, and are short; they are therefore not inclined to break. This excellent fruit being justly esteemed is much propagated by ingrafting in New-Jersey.

3. The *Harrison Apple*, or *Long Stem.* It is of a moderate size, and of a rich dry taste, with a tartness that renders its sweetness agreeable and lively. It ripens about the beginning of November; keeps a long time, and answers well for culinary purposes. The cyder made from this apple is clear, high coloured, rich, and lively. General Washington was presented with a barrel of it by Judge Boudinot, of Newark, New-Jersey, and he declared his preference of it to that made from Hughes' Virginia Crab. Mr. Samuel Harrison, now eighty-four years of age, informed Mr. A. Hillyes, of Essex county, New-Jersey, "That his father, nearly ninety years ago, obtained a large number of small sprouts, from a Mr. Osborne, of South-Orange, which he planted in a nursery: that several years afterwards they were transplanted into an orchard: fifteen or twenty of these trees bore the fruit which was first called the *Osborne Apple:* afterwards the *Long Stem*, and is now called the *Harrison Apple.* Three of the original trees are now standing in the orchard where they were at first planted, and are still bearing and thrifty, although they are nearly ninety years of age. "No person among us, (says Mr. H.) has seen or heard of any of this kind of fruit which has not been propagated from the above mentioned trees." The cyder of this fruit sells from eight to ten dollars per barrel.

Mr. Coxe observes, "As a more vinous, rich, and highly flavoured liquor, I prefer the *Harrison* to the *Crab* cyder. This preference may depend on peculiarity of taste. The two liquors may in some degree be compared to the still and sparkling Champagne, both of which have their exclusive admirers."

4. The *Camfield Apple*, is a large sweet fruit, of a pale red colour, ripens about the beginning of Oct. and keeps well, if carefully picked: being a rich fruit, it is necessary to mix the Harrison apple with it, in order to fine the cyder produced from it. This apple was brought to Newark, New-Jersey, by the late E. Camfield.

5. *Vanwinkle*, or *Graniwinkle*, is a large red and very sweet apple; rich taste, and fine flavour; ripe about the middle of October, when the fruit falls, and decays so rapidly, that it is difficult to preserve the apples till the proper time for making first rate cyder. These apples answer best when mixed with half their quantity of the Harrison apple. Cyder made from this apple alone, resembles unfermented metheglin, and must remain in

the barrel until the next summer, when it will fine. The tree originated in the orchard of THOMAS WILLIAMS, dec. according to Mr. HILLYES of Orange; but Mr. JOHN OGDEN of Newark, says, he was told the first graft was taken from a tree belonging to an old lady, Mrs. VANWINKLE POVESHON.

5. *Yellow Sweeting*. A large yellow sweet apple, will keep till harvest, makes good cyder, and answers for family use. Mr. J. OGDEN's father took the scion from an old tree of JOHN JOHNSTON's, at Connecticut farms, fifty years ago.

6. *Rariting Sweeting*. Rich flavour; egg-shaped; makes good cyder, which keeps well: brought from Rariton, by Mr. OGDEN's father.

7. "There is another apple," says Mr. BOUDINOT, "which is esteemed by some farmers as an excellent cyder apple. It is of a middling size; about one half of it is green, and the other of a reddish cast: it is called a *Sweeting*, but is different from the *Rariton* Sweeting: it is a rich sweet apple, and requires a mixture of the Harrison, or some other tart apple, to make the liquor bright. It is a firm apple, and will keep till June."

8. The *Grey-house*. Mr. RILEY, of Marcus-Hook, thinks this is not excelled by any for making excellent cyder: it is of a middling size, reddish grey colour, ripe in Oct. Cyder is made of it in November. The tree bears but every other year, and then is heavily loaded. It is a very tender fruit, though late in blossoming. At the time of the formation of this fruit it is very subject to perish by easterly winds, attended by cold rains, which frequently cause the apples to fall off in abundance, sometimes to the loss of the whole crop; and, on an average, the tree does not succeed in bearing a good crop above one fourth of the time. "It appears to me, (says Mr. R.) much more tender than any fruit I have met with. It was first discovered by P. ROMAN in this township, (Marcus-Hook), by a natural tree that grew close to his house: hence called his house-tree, and by some Roman Knights. This tree is of a middling size, inclines to grow low, and is short lived. Twelve bushels of these apples are required to make a barrel of cyder."

9. The *Red-House*. A fair apple, of a deep red; keeps pretty well. It makes thin rough cyder, not much in use. Ten bushels of these apples are required to make one barrel of cyder.

10. The *Collett*. Is a large and fair apple, of a pale striped colour, somewhat speckled: of a spicy and pleasant taste; keeps as well as common; makes poor thin cyder; a native of Chester county, Pennsylvania. Very few of these trees are now planted.

11. *Cart-House* or *Gilpin*. A useful apple, keeps well, tolerably good for house use and cyder. This is said to come originally from Virginia.

12. *Wine-Sop*. An autumn fruit, of a deep red colour, and sweet, but not sprightly taste; makes excellent cyder, which is preferred by some to that of the red streak; cultivated by SAMUEL COLES, of Moore's-town, New-Jersey.

13. *Poveshon*. Is a small red apple, ripe about the latter end of September, of a pleasant flavour, and makes good early cyder, for which purpose it is generally used about Newark, New-Jersey.

14. *Red-Streak*. Originally from

England: a winter fruit; keeps well, but shrinks; of a pleasant flavour; red with spots, and generally has a russet coloured teat on the lower side. The tree grows straight. When used for pies they need not be pared. The cyder from this apple is much admired.

15. *Catline.* A Delaware autumn cyder fruit.

16. *Gloucester.* Native of Virginia, and good cyder fruit.

17. *Golden Rennett*, P. An autumn cyder fruit.

" The *Pyrus Coronaria*, or *Native Crab Apple of North America*, is not eaten except when preserved in sugar, and in this state they are deservedly esteemed as a great delicacy. The fruit is flattish, above one inch in diameter, yellow when ripe, or of the colour of polished brass, and possesses an agreeable fragrancy. Perhaps no tree presents a more gay appearance in the spring, when dressed in green, and with clusters of flowers of a most pleasing blush. The petals may be compared to flakes of white wax, faintly tinged with the finest carmine; though some trees have flowers of a damask rose colour."....WM. BARTRAM.

The Editor is indebted to his excellent friend, Dr. JAMES TILTON, of Wilmington Delaware, for the following original and very valuable communication, on the subject of the insect which has been so actively engaged in destroying the fruit of Pennsylvania, Delaware, (and probably of the other states), for a few years past. It were to be wished, that other gentlemen among us, who have opportunities, would be equally attentive with Dr. TILTON, in communicating their observations upon this subject of rural economy.

" CURCULIO, a genus of insects belonging to the *Coleoptera*, or *Beetle* order. The species are said to be very numerous. The immense damage done, by an insect of this tribe, to the fruits of this country, of which there is no similar account in Europe, has given rise to a conjecture with some naturalists, that we have a peculiar and very destructive species in America.

" The manner in which this insect injures and destroys our fruits, is, by its mode of propagation..... Early in the spring, about the time when the fruit trees are in blossom, the *Curculiones* ascend in swarms from the earth, crawl up the trees, and as the several fruits advance, they puncture the rind or skin, with their pointed rostra, and deposit their embryos in the wounds thus inflicted. The maggot thus bedded in the fruit, preys upon its pulp and juices, until in most instances, the fruit perishes, falls to the ground and the insect escaping from so unsafe a residence, makes a sure retreat into the earth: where, like other beetles, it remains in the form of a grub or worm, during the winter, ready to be metamorphosed into a bug or beetle, as the spring advances. Thus every tree furnishes its own enemy; for although these bugs have manifestly the capacity of flying, they appear very reluctant in the use of their wings; and perhaps never employ them but when necessity compels them to migrate. It is a fact, that two trees of the same kind may stand in the nearest possible neighbourhood, not to touch each other, the one have its fruit destroyed by the Curculio, and the other be uninjured, merely from contingent circumstances, which prevent the insects from crawling up the one, while they are uninterrupted from climbing the other.

"The Curculio delights most in the smooth skinned stone fruits, such as nectarines, plums, apricots, &c. when they abound on a farm: they nevertheless attack the rough skinned peach, the apple, pear, and quince. The instinctive sagacity of these creatures directs them especially to the fruits most adapted to their purpose. The stone fruits more certainly perish by the wounds made by these insects, so as to fall in due time to the ground, and afford an opportunity to the young maggot to hide itself in the earth. Although multitudes of seed fruits fall, yet many recover from their wounds, which heal up with deeply indented scars..... This probably disconcerts the curculio, in its intended course to the earth. Be this as it may, certain it is, that pears are less liable to fall, and are less injured by this insect than apples. Nectarines, plums, &c. in most districts of our country, where the curculio has gained an establishment, are utterly destroyed, unless special means are employed for their preservation.... Cherries escape better, on account of their rapid progress to maturity and their abundant crops: the curculio can only puncture a small part of them, during the short time they hang upon the tree. These destructive insects continue their depredations from the first of May until autumn. Our fruits collectively estimated must thereby be depreciated more than half their value.

"It is supposed the curculio is not only injurious above ground, but also in its retreat, below the surface of the earth, by preying on the roots of our fruit trees. We know that beetles have, in some instances, abounded in such a manner as to endanger whole forests. Our fruit trees often die from manifest injuries done to the roots by insects, and by no insect more probably than the curculio. In districts where this insect abounds, cherry trees and apple trees, which disconcert it most above, appear to be the special objects of its vengeance below the surface of the earth.

"These are serious evils; to combat which, every scientific enquirer is loudly called upon to exert his talents; every industrious farmer to double his diligence, and all benevolent characters to contribute their mite.

"Naturalists have been accustomed to destroy vicious insects, by employing their natural enemies to devour them....[See Blight.]

"We are unacquainted with any tribe of insects able to destroy the curculio. All the domestic animals, however, if well directed, contribute to this purpose. Hogs in a special manner are qualified for the work of extermination. This voracious animal, if suffered to go at large in orchards, and among fruit trees, devours all the fruit that falls, and among others the curculiones, in the maggot state, which may be contained in them. Being thus generally destroyed in the embryo state, there will be few or no bugs to ascend from the earth in the spring, to injure the fruit. Many experienced farmers have noted the advantage of hogs running in their orchards. Mr. Bordley, in his excellent '*Essays on Husbandry*' takes particular notice of the great advantage of hogs to orchards; and although he attributes the benefits derived from these animals to the excellence of their manure, and their occasional rooting about the trees, his mistake in this trivial

circumstance does by no means invalidate the general remarks of this acute observer. The fact is, hogs render fruits of all kinds fair and unblemished, by destroying the curculio.

"The ordinary fowls of a farm yard are great devourers of beetles. Poultry in general are regarded as carnivorous in summer, and therefore cooped sometime before they are eaten. Every body knows with what avidity ducks seize on the tumble bug, (*Scarabæus carnifex*), and it is probable the curculio is regarded by all the fowls as an equally delicious morsel. Therefore it is, that the smooth stone fruits particularly, succeed much better in lanes and yards, where the poultry run without restraint, than in gardens and other enclosures, where the fowls are excluded.

"Even horned cattle and all sorts of stock may be made to contribute to the preservation of our valuable fruits. By running among the trees, they not only trample to death multitudes of these insects; but by hardening the ground, as in lanes, it becomes very unfit to receive or admit such tender maggots as crawl from the fallen fruits. Besides, the curculio is very timid, and when frightened by the cattle rubbing against the tree or otherwise, their manner is to fold themselves up in a little ball and fall to the ground; where they may be trampled and devoured by the stock, poultry, &c. Col. T. Forest, of Germantown, having a fine plum tree near his pump, tied a rope from the tree to his pump handle, so that the tree was gently agitated every time there was occasion to pump water. The consequence was, that the fruit on this tree was preserved in the greatest perfection.

"All the terebinthinate substances, with camphor and some others, are said to be very offensive to insects generally. Upon this principle, General T. Robinson, of Naaman's creek, suspends annually little bits of board, about the size of a case knife, dipped in tar, on each of his plum trees.... From three to five of these strips are deemed enough, according to the size of the tree. The General commences his operations about the time or sooner after the trees are in full bloom, and renews the application of the tar frequently, while the fruit hangs on the tree. To this expedient, he attributes his never failing success. Other gentlemen allege, that common turpentine would be still better; being equally pungent and more permanent in its effects. Some have sown offensive articles, such as buckwheat, celery, &c. at the root of the tree, and have thought that great advantages followed.

"*Ablaqueation*, or digging round the trees, and making bare their roots in winter, is an old expedient of gardeners for killing insects, and may answer well enough for a solitary tree, a year or two; but the curculio will soon recover from a disturbance of this sort, and stock the tree again.

"There is no surer protection against the curculio than a pavement. This, however, is only aplibable to a few trees. It may serve in town; but will not answer in the country...[Flat stones may however be placed round the tree, and where lime is at hand, they may be cemented.]

"Many other expedients, such as smoking, brushing, watering, &c. may be successfully employed, for the protection of a favourite tree or two; but it is manifest, from

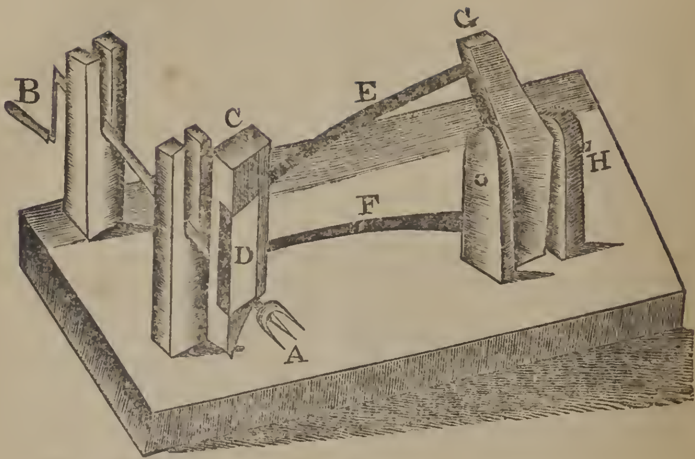
the preceding history, that a right disposition of stock, especially hogs, among the fruit trees, can only be relied on by a farmer, with orchards of considerable extent. And that the stock, poultry, &c. may perform the task assigned them, it is evident, that a proper disposition of fruit trees is essentially necessary.

"As the smooth stone fruits are the grand nurseries of the curculio, special care should be taken, to have these effectually protected. Unless this can be done, a farmer should not suffer them to grow on his plantation. He will derive no benefit from them; and they will furnish a destructive vermin that will ruin his other fruits. Cherry trees, nectarines, plums, apricots, &c. should therefore be planted in *lanes* and *hard beaten yards*, [or paved yards,] the common highways of all the stock of the farm, and not beyond the range of the ordinary domestic fowls. Orchards of apple trees, pear trees, peach trees, &c. should all be in one enclosure. The pear trees and peach trees may occupy corners of the whole design, so as occasionally to be fenced off. In large orchards, care should be taken that the stock of hogs is sufficient to eat up all the early fruit which fall, from May until August. This precaution will be more especially necessary in large peach orchards: for, otherwise, when the hogs become cloyed with the pulp of the peach, they will let it fall out of their mouths, and content themselves with the kernel, which they like better; and thus the curculio escaping from their jaws may hide under ground, until next spring. Solitary trees of one fruit or another, remote from the orchard, should be regarded as nurseries of the curculio, and ought to be cut down or removed to the common enclosure. A young orchard should not be planted in the place of, or adjacent to an old one; that it may not be immediately infested with the curculio.

"It is also apparent, from what has been said, that great advantages might result from an association or combination of whole neighbourhoods against this common enemy. Although an intelligent farmer may accomplish much, by due attention, within his own territory, the total extermination of the curculio can hardly be expected, but by the concurrent efforts of whole districts."

[On this subject it may be added, that a gardener near Baltimore, who has been successful in raising plums, finds that the insect does most mischief in the night; and hence he shakes the tree every evening, and catches the insect in a sheet placed round it. He always burns them instantly. Wrapping each plum in a muslin bag, or in thin paper perforated with a pin, is a certain, though troublesome mode of guarding against the attacks of these insects.

A machine for paring apples, has lately been invented by Mr. Moses Coates, of Chester county, which, on account of its simplicity, and the expedition with which it works, will no doubt come into general use. The following cut will give an accurate idea of this instrument.



The apple is fixed on the three pronged fork A, and is turned by the handle B. To the block C, the knife D is fastened in the manner of a spoke shave. E and F are springs which fasten the knife to the piece G, turning on a pin at H. While the right hand turns the handle B, the left presses against the springs E, F, and turns the knife in a semicircle over the apple. The Editor has tried the experiment with the machine, and found it to pare apples with great rapidity.]

Colours from Fruits.....The red juices of currants, mulberries, elder-berries, black-cherries, and other fruit, impart their tinging particles to water, but more completely to rectified spirit; and the tincture acquires a brighter colour. The red watery solutions, as well as the juices, are sometimes rendered dull, and sometimes more lively, by means of acids; they generally acquire a purplish hue, by the addition of alkalies. The greater part of the colours of these juices is perishable, though they strongly resist fermentation, and continue almost unchanged, when the liquor is converted into wine. If the juice be thinly spread upon other bodies, exsiccated, and exposed to the air, the colour speedily decays; the bright red fades sooner than any other; but the dark dull red obtained from the juice of the black-cherry, is of considerable durability. The ripe berries of the buck-thorn tinge paper of a green colour: when green, those berries afford a yellow, and if ripe, a purplish pigment. There are besides a great variety of other fruits, both wild and cultivated, which impart different colours, and which are noticed in their alphabetical series.

As we treat of the general properties, as well as the relative salubrity of fruit, under the individual heads of shrubs and trees, we shall, in this place, only add, that the injudicious practice of promiscuously allowing it, whether ripe or unripe, to children and infants, is very reprehensible. On account of its acidity, they are not able to bear it in excess; and their digestive powers become too frequently impaired at the expense of other secretions; such as insensible perspiration, and the discharges by stool, both of which are thus unnaturally promoted. All fruit given to young people ought to be perfectly *ripe:* mothers and nurses should likewise bestow especial attention on the cleanliness of the peels, or shells, which as they generally pass, through different hands, or may have been stored in improper places, require to be previously wiped or washed.

FRUMENTY, or Furmenty, as it is popularly called, is a kind of pottage, prepared of wheat, which is first dried whole in an oven, afterwards boiled, and put into moulds, or basons. In this country, it is chiefly made during Lent; and, when boiled up with milk, sugar, and a little spice. it forms a wholesome and nutritive dish.

FRUSH, or Running-Thrush, in farriery, is a discharge of fetid, and sometimes ichorous matter, from the cleft in the middle of an horse's foot. It affects one, two and sometimes all the animal's legs; but more frequently appears in the fore-feet. It is occasioned by narrow, concave, or hollow shoes; which, pressing against the fleshy part of the frog, cause pain, inflammation, obstruction of the blood, &c. There are few cases in which the frush admits of a radical cure, because it is subject to frequent returns, producing at length lameness, in consequence of exposing the raw and tender parts to the action of sand, gravel, hard ground, &c.

But, if the disease proceed from contracted, narrow heels, in those feet which are said to be *hoof-bound*, it cannot be cured, without removing the first cause; though even in that case it will only admit of palliation. In wide hoofs, however, that are open at the heels, and where the complaint is recent, or is suspected to arise from concave shoes, or from keeping the hoofs too hot, dry, and hard, the cure may be effected with ease and safety, by laying aside those shoes; washing the frogs clean after exercise, and dressing them with *Mel Ægyptiacum*, prepared in the following manner:. Take 2 oz. of verdigrease finely pulverized; 6 oz. of honey, and 4 oz. of vinegar: let the whole be boiled over a gentle fire till it acquires a reddish colour. Or, 2 oz. of blue vitriol, dissolved in a quart of water, may be substituted for the preceding composition, if the hoofs be kept cool and moist. At the same time, it will be requisite to have recourse to bleeding, and purging-medicines, which may be repeated two or three times at proper intervals; or, to diuretics, which are preferable, as they may be continued for some time, without confining the horse to the stable.

FUEL is the aliment or food of fire.

The fuel generally used in Britain is pit-coal: it is attended with considerable expense, that is not a little increased by the enormous waste, arising from the injudicious

manner in which the fires are usually managed. Hence different compositions have been proposed, among which that contrived by Count RUMFORD more particularly claims our attention. It is known by the name of *kindling balls*, which are composed of equal parts of *coal*, *charcoal*, and *clay*; the two former are reduced to fine powder, well mixed and kneaded together with the clay moistened with water; and then formed into balls of the size of hens' eggs, which are thoroughly dried. These balls may be made so inflammable as instantly to take fire from the smallest spark after they have been dipped in a strong solution of nitre, and then dried. With those three ingredients, Count RUMFORD is of opinion, that a certain proportion of straw, cut very small, or of chaff, or even of saw-dust, may be advantageously incorporated......The excellence of the fuel thus prepared consists in its economy and cleanliness; circumstances of the utmost importance, and which are calculated greatly to improve the apartments of the opulent: for, he observes, "nothing is more dirty, inelegant, and disgusting, than a common coal-fire."....The Count's invention is somewhat similar to the patent COAL-BALLS prepared by Mr. FREDERICK of which we have already given an acount.

To this may be added, the *improved fuel* invented by Mr. PETER DAVEY, to whom a patent was granted early in the year 1801. The substances he employs are, a mixed coke composed of pit-coal and charcoal, in various proportions, united previously to the operation of *coking*. The patentee takes small sea-coal, to which he adds charcoal, saw-dust, tan, or any other materials that may be converted into charcoal, in proportionate quantities: these, however, are not specified, and he simply observes, that for furnaces, or other large fires, the quantity of sea-coal is to be increased; and, when the fuel is intended to be burned in small fires, it is to be diminished. After mixing the different ingredients, they are to be dried in kilns, and heated so as to make them intimately cohere, and expel the moisture and oily parts, without consuming the substance of the coal: in this state, the fuel is fit for use.

We do not pretend to decide, which of the preparations abovementioned is preferable; as they are all eminently calculated to introduce economy in one of the most useful articles of domestic convenience.....*fire*.

Beside these compositions, various machines have been invented for saving fuel, of which the following are worthy of notice:....In May, 1792, Mr. DAVID FREARSON, of Liverpool, obtained a patent for machinery and operations for the purpose of saving fuel, in the process of evaporating water from solutions of salts, or the waste or leys of soap-makers; and which may be applicable on other occasions, where the evaporation of water from substances holding it in solution is required. For the particulars of this invention we refer the reader to the 9th vol. of the "*Repertory of Arts and Manufactures*," where he will find the whole process amply detailed.

A patent was likewise granted in June, 1798, to Mr. GEORGE BLUNDELL, of Bethnall-green, Middlesex, for his invention of a machine calculated for the purpose of

saving fuel, and preventing dirt or dust from fires, which he calls an "*Economical Receiver*."....The apparatus consists of certain receivers, or boxes, formed of metal, either simple, or compound, and which are either square, oval, or of any other shape that may be required, in order to be fitted beneath any kind of grates, stoves, or fire-places. Over this receiver is fixed a grating, or net-work of wire, which intercepts the cinders, and suffers the the ashes to fall into the lower part of the vessel. There are likewise sliders, and other pieces of machinery; an explanation of which is inserted in the 10th vol: of the work above cited.

FULLERS'-EARTH, or *Argilla Lithomarga*, is a species of clay, of an ash-coloured brown, and presents various shades, from a very pale to nearly a black colour: it is in general of a greenish cast.

This earth is hard, firm, and of a compact texture, but soft to the touch, and neither stains the hands nor easily breaks between the fingers. Its surface is somewhat rough and harsh; it dissolves easily in the mouth; and, in a slight degree, adheres to the tongue. When thrown into water, it does not cause any effervescence, but gradually increases in size, and subsides in a fine soft powder.

The largest stock of the finest fullers'-earth in the world is obtained from the pits at Wavedon, near Woburn, Bedfordshire; where strata of it are found at the depth of ten or twelve feet from the surface of the ground. This earth is also found in abundance, and of a good quality, in certain pits near Brick-hill, in the county of Stafford; near Ryegate, Surrey; Maidstone, Kent; and in the vicinity of Nutley and Petworth, in the county of Sussex.

Incalculable quantities of fullers'-earth are consumed in this country, in the scouring of cloths, stuffs, &c. for which it is of the greatest utility, as it imbibes all the grease and oil used in the preparing, dressing, &c. of wool. For this reason, it is declared to be a contraband commodity, and is prohibited to be exported, under the penalty of one shilling for every pound weight....As an article of domestic economy, it might be more frequently employed than it is at present, especially in the cleaning and scouring of wooden floors and wainscots, being an excellent substitute for soap, of which great quantities are now consumed, and unnecessary expense of house-keeping thus incurred.

FULLING, is the art of cleansing, scouring, and pressing cloths, stuffs, and stockings, to render them stronger, closer, and firmer: it is also sometimes called *milling*.

The fulling of cloth, &c. is performed by a kind of water-mill, thence called a *fulling* or *scouring-mill*....Without describing the mechanism of this manufacturing process, we cannot omit to remark, that urine is sometimes employed, as well as soap and fullers'-earth, to prepare the stuffs for receiving the first impressions of the pestle. They are first steeped in urine, then in a solution of fullers'-earth and water, and lastly in soap, dissolved in hot water. Soap alone would fully answer this purpose, but it is too expensive, especially as, according to the present mode of dressing, fullers'-earth is of equal efficacy. Urine is certainly prejudicial, and ought entirely to be abandoned here, both on account

cf its disagreeable smell, and its sharp, saline properties, which frequently render the cloths dry and harsh. The *scouring* of cloth, however, is not the only object in *fulling* it; the alternate pressure communicated by the pestles, or stampers, to the stuffs, occasions in its advanced stages an effect analogous to that produced upon hats in the operation of *felting*. Thus, the fibres of wool which compose one of the threads, whether of the warp or the woof, assume a progressive motion, first introducing themselves among those of the contiguous threads, then into those which follow, so that gradually all the threads, both of the warp and the woof, become completely felted. The cloth, after having by this process become contracted and shortened in its dimensions, partakes in a great measure of the nature of *felt:* hence it may be cut without being liable to unravel; and consequently there is no necessity to hem its edges....Farther, as the threads of both the warp and woof are more intimately combined, the web, which acquires a greater degree of thickness, likewise forms a warmer clothing.

The process of *fulling stockings*, *caps*, &c. is performed in a manner somewhat different from that in the mills; namely, either with the feet or hands; or a kind of rack or wooden machine, armed with teeth of the same materials; or, which is still better, horses' or bullocks' teeth may be substituted. In this operation, urine, green soap, white soap, and fullers'-earth are employed, but the first of these ingredients, for the reasons before stated, is here also detrimental to the texture. Stockings manufactured in a loom, should be fulled with soap alone; but, for dressing such as have been knit, earth may likewise be added. Lastly, knit worsted is by this process rendered less subject to *run*, if a stitch should happen to drop in the stockings.

[FUMARIA, *Cucullaria*, (*Capnorchis*, Dutchman's breeches.) A very singular and handsome plant. The elegantly complex texture of its leaves, of a soft, glacous green colour, together with its racemes of milk-white flowers, having lips studded as it were with gold, give it an air of great softness and elegance. The flower is of a singular structure, having two, or rather a double nectary conjoined, resembling a pair of breeches. We have two other species of *fumaria* in the United States, both of which are very beautiful plants, viz. f. *glauca*, and f. *fungosa*. The last mentioned grows in the rich vallies of our northern mountains, but on account of its singular elegance, has lately been introduced into our gardens. It is a biennial vine, rambles to a great extent over shrubs during the flowering season. Its foliage is truly elegant, and its tufts of incarnate blossoms excite general admiration....Wm. Bartram.]

FUMIGATION, in medicine, denotes the artificial impregnation of the atmosphere, with the fumes or smoke of any vegetable or aromatic substance.

Considerable injury is often produced by inhaling the subtle corrosive fumes of metallic and other processes; so that palsy in lead-mines, and pulmonary complaints, in manufacturing towns, are but too frequent; hence we doubt whether *medicated fumes* deserve that encomium which has lately been bestowed on them, by various

writers. In our opinion, there is no better and more effectual fumigator in Nature than *pure air*, frequently renewed by means of *ventilators*.

As, however, there are numerous advocates for *factitious* airs and fumigations, we have no hesitation to admit that they may sometimes be resorted to with advantage, for the purpose of purifying rooms that have been occupied by patients whose disorders were contagious. Hence the fumes of tobacco, and the effluvia of tar, have been especially praised. The late Dr. LIND advised cascarilla-bark to be burned, or the camphorated steam of vinegar to be diffused, as being eminently calculated to dispel infection.

With respect to the fumigation of stables, or other buildings, where cattle are infected with the *distemper*, it has been recommended to put an ounce of common salt in a varnished pipkin, upon which are to be poured two ounces of spirit of vitriol, diluted with one ounce of water. The vessel is then to be placed for an hour on a chafing-dish provided with live coals, in order that its contents may be heated to a slight degree of ebullition..... The whole being safely deposited in the middle of a stable, the vapours are permitted to rise, till the air of the building is saturated. Thus, the malignant miasmata in the air, are supposed to be neutralized, or corrected; but the process ought to be repeated twice in twenty-four hours, at equal periods, during the prevalence of the contagion...No good, however, will result from this or any other fumigation, without the frequent admission, and change, of fresh air.

FUMITORY, or *Fumaria*, L. a genus of plants comprising nineteen species, five or six of which are natives; and among these the principal are:

1. The *officinalis*, or Common Fumitory. It is annual, grows in corn-fields, hedge-banks and gardens, and is in flower from May to August....This plant is eaten by cows and sheep; goats dislike it, except the young shoots, but horses totally refuse it....The leaves are succulent, saline, and bitter. The expressed juice, in doses of two or three ounces, is strongly recommended in hypochondriacal, scorbutic, and such habits as abound with vitiated humours. It corrects acidity, and strengthens the stomach. HOFFMAN, in these cases, preferred it to all other medicines. On account of its efficacy in opening obstructions, and what are professionally called *infarctions* of the viscera, especially those of the liver an extract of it deserves to be kept in the shops. If the juice be taken in large doses, it proves both diuretic and laxative: it may also be mixed with whey, and used as a common drink...An infusion of the leaves of this plant is employed as a cosmetic, to remove freckles from the skin.

2. The *solida v. bulbosa*, or Solid Bulbous Fumitory, which grows in woods and parks, (for instance, Levan's Park,) and flowers in April or May....BECHSTEIN relates, that this plant affords a certain remedy for the extermination of frogs in fish-ponds.

FUNERAL RITES are those ceremonies which are religiously observed at the interment or burial of the dead. They varied among the ancients, according to the different genius and religion of each country.

It is not, however, our design to specify these ceremonies, but merely to point out an abuse that loudly claims the attention of all. In many populous parishes, within the bills of mortality, a dangerous practice prevails, of excavating pits (graves they cannot be called) for the reception of the poor, who being *packed* in four deal-boards loosely nailed together, are there deposited, till the whole is sufficiently filled. During the interval, planks are laid over the common grave; and, when the uppermost coffin arrives, a minister is employed to mutter, at once, the usual prayers over the hapless victims of poverty, who are then covered with the maternal earth. Such mal-practice demands an immediate remedy; as the mephitic vapour arising through the planks, especially during summer, have the most noxious properties; and perhaps many have met with a premature grave, from inhaling those putrid exhalations......Facts like these, we conceive it our duty to state, on account of their immediate influence on the health of every inhabitant.

Fungus, See MUSHROOM, and WHITE SWELLING.

FUR, in commerce, signifies the skins of wild quadrupeds, which are dressed with alum, without depriving them of the hair; and which form a part of the robes of princes, magistrates, and others. The skins chiefly used are, those of the sable, ermine, bear, beaver, hare, &c.

Furs did not become an article of luxury in this country for many ages, and were imported principally from Italy, till, since the conquest of Canada and the more northern parts of America, we have obtained them from the Indians.

The furs at present used, are those brought from the remotest parts of North America by the Hudson's Bay Company, and from Russia. They are very valuable, especially the skins of ermines, black foxes, and sables for which various prices have been paid, from 20 to 100 guineas....Imported furs are subject to heavy duties, which our limits will not permit us to enumerate.

With respect to its influence on health, we shall briefly remark, that *fur* deserves no commendation as an article of ordinary dress. Its alkaline and oily particles stimulate the skin, when in contract with it; thus partially increase perspiration, and lay the foundation of colds and catarrhs. A fur dress readily attracts infection, and soon acquires an intolerable smell. Hence whole nations that wear such garment, are exposed to obstinate cutaneous diseases, and, perhaps, to the propagation of the plague itself: which is said to be spread among the Turks, chiefly, by their absurd and cumbersome dresses lined with animal hair.

FURNACE, an utensil, or apparatus, in which a strong fire, either of coals or of wood, may be raised and maintained.

There is a great diversity of furnaces, according to the different purposes to which they are applied; but, as it would exceed our limits to specify them, we shall only state the chief points to be attended to in their construction, and next mention the various patents that have been granted to speculative individuals....The chief objects in building, and arranging a furnace, are:

1. To confine the heat as much as possible to the matter which is to be operated upon. Hence the fire is usually limited to a cavity formed with that intention, and which is provided with a door for supplying it with fuel, as likewise with a grate for supporting it, and permitting the air to pass through, as well as the ashes to drop down into what is called the *ash-pit*...... Thus, the heat is restrained so as to exhaust its force on the subject inclosed.

2. To prevent such heat from being dissipated; which design is effected by simply shutting the door of the furnace, and placing the matter to be acted upon, in such a direction as to receive the whole force of the fire, in its passage up the chimney.

3. To produce an intense heat with the smallest possible quantity of fuel. Hence the throat, or funnel of the chimney, is occasionally contracted by a sliding plate; which, when shut closely, prevents the passage of any smoke or air; and, on drawing it out in a greater or less degree, leaves a vent proportionally large or small. Thus, a large quantity of fuel may be put in the furnace at one time, that will be slowly consumed, and consequently requires less attention, than those furnaces which are destitute of this improvement. Where no great degree of heat is required, the sliding plate may be of cast-iron; in some, cases however, fire-clay will be more serviceable; but this contrivance is inapplicable to such furnaces as consume large quantities of fuel, and especially where metals are to be melted.

4. To arrange the whole, so that the degree of heat may be regulated at pleasure; which intention is effected by admitting only a certain portion of air to pass through the fuel. For this purpose, the late Dr. Black recommended to fill the upper part of the furnace frequently with small portions of soot, so that by closing the door of the *ash-hole*, and perforating it with a certain number of holes corresponding to each other, a sufficient controul may be obtained over the fire. When the heat is to be increased, all the passages should be opened, and the height of the vent extended; by which means the column of rarefied air will be enlarged, at the same time its passage through the fuel promoted, and consequently also the heat of the furnace rendered more intense.

In June, 1785, a patent was granted to Mr. James Watt, of Birmingham, for his newly-improved method of constructing furnaces or fire-places for heating, boiling, or evaporating water, or other liquids; and also for heating, and melting metals, or smelting ores; by which greater effects are produced from the fuel, and the smoke is in a great measure prevented or consumed. The patentee effects these different objects, by closing every passage to the chimney or flues, excepting those left in the interstices of the fuel; by placing fresh fuel above or nearer to the external air, than that which is already converted into coke or charcoal; and by constructing the fire-places so that the flame must pass downwards, or laterally, or horizontally, through the burning fuel, and also from the lower part or internal side of the fire-place, to the flues or chimney.......In some cases, Mr. Watt causes the flame to pass

through a very hot funnel, or flue, previously to its arriving at the bottom of the boiler, or at that part of the furnace, where it is intended to melt metals; by which contrivance the smoke is still more effectually consumed. In other cases, he directs the course of the flame from the fire-place immediately into the space beneath a boiler, or into the bed of a melting or other furnace....A minute account of this machinery is inserted in the 4th vol. of the "*Repertory of Arts and Manufactures*," where it is described and illustrated by engravings.

In 1794, Mr HENRY BROWNE, of Derby, invented an ingenious furnace, calculated to facilitate evaporation; for which the *Society for the Encouragement of Arts*, &c. rewarded him with a gold medal ....By this arrangement, the heat is first carried under the vessel, then reverted back on the sides, and, at length, conveyed over the surface: thus the air in contact with the liquor is heated and rarefied to such a degree, that the fluid is raised into vapour or steam, much sooner, and with less fuel, than in the cold atmosphere; and, as the air necessary to keep the fuel in combustion passes over the surface of the liquor, every pernicious vapour is carried with it into the fire, where it is decomposed, or at least rendered innoccuous. Mr. BROWNE's furnace is likewise so constructed, that as much fuel may be laid on the fire at one time as will be required for twelve, or even twenty-four hours; and thus one man is enabled to perform the labour of *three*, with much greater facility than by the usual method. Beside this advantage, the evaporation is more speedily effected; less fuel is consumed than in the common boilers now in use; and, neither the operator nor the neighbourhood will be annoyed with the most pernicious vapour.... Those who wish to be informed of the various parts of this useful contrivance, we must refer to the 12th volume of the "*Transactions*" of the Patriotic Society before mentioned, where it is minutely described, and illustrated by an elegant engraving.

A patent was granted in December, 1798, to Mr WILLIAM RALEY, of Newbald, in the East-Riding of Yorkshire, chemist; for his invention of a philosophical furnace and boiler, with an actuating wheel appended to them; and which are applicable to the drawing of foul and inflammable air from pits, mines, &c. to several branches of pharmacy, and various mechanical purposes. As, however, this machinery is scarcely suitable to domestic economy, we shall only add, that the specification of it is contained in the 10th volume of the "*Repertory of the arts and Manufactures.*"

The last patent which claims our notice, is that granted in November, 1799, to Mr JAMES BURNS, of Glasgow, builder; for his invention of certain improvements applicable to furnaces, fire-grates, stoves, and chimnies, by which a greater supply of heat may be obtained from a given quantity of fuel; and rooms of every description may be heated more speedily and effectually than by the methods now in use; while they are calculated in a great measure to prevent accidents from women's and children's clothes taking fire, and also to give a degree of cleanliness which cannot be attained where grates and stoves of

the common construction are employed. The design of this contrivance is to prevent the heat, generated and thrown out into any room or apartment by combustion, from being unnecessarily wasted by the air of such room being made to maintain the combustion of the fuel in the grate. To effect this purpose, the air supporting the fire in the grates or stoves made with the patentee's improvements, or in other grates to which they may be applied, ought to be conveyed through a tube (which he calls an air-tube) from the outside of the house: or it may be made to pass from the outside of the house between the joists, so as to be brought to the bottom bars of the grate, without communicating with the interior air of the room; while the grates, and other parts connected with them, should be so constructed, that the passage may be closed in a greater or less degree by means of a valve, small door, cock, or any similar contrivances, whenever it is not requisite to supply the fire with cold air from the outside of the house: or, the same object may be attained by directing the tube to a cellar, larder, &c. which will thus be thoroughly ventilated, and prevented from acquiring unhealthy or disagreeable smells..... As our limits will not permit us to specify the constituent parts of Mr. BURN's design, we refer the reader to the 12th vol. of the *Repertory, &c.* above quoted, where it is minutely described, and farther illustrated by two plates. But we cannot conclude the subject, without stating, that his improvements are affirmed to be an effectual cure for smoky chimnies; and when a fire is lighted in grates of the patentee's construction, it burns up, and becomes lively in a few minutes, without the aid of bellows, and that watchful care which common stoves or grates require.

The construction of furnaces, so arranged as to consume the whole volume of smoke, is an object which has long engaged the ingenuity of artists.....Hence various contrivances have been proposed; but few, we believe, for efficacy and simplicity, can come in competition with that invented by Messrs. ROBERTSONS, of Glasgow. The opening of their furnaces, instead of being closed by a door, consists of a quadrangular hopper, or funnel, which is constantly supplied with coals; so that, in proportion as the fuel is exhausted, a fresh stock continually descends through the hopper....... Thus, the first combustion, which disengages the greatest part of the smoke and flame, takes place near the mouth of the fire-place, and a considerable quantity of the smoke will, without any other contrivance, be consumed by passing over the red-hot fuel in the farther part of the furnace. But, as a perfect combustion of smoke cannot be obtained without the aid of atmospheric air, a cast-iron plate, about three quarters of an inch above the top of the hopper, is introduced, so that a slit is formed of this depth, and of an equal breadth to the front of the furnace; through which a current of air constantly enters, and is then combined with the smoke.... This aperture may be enlarged, or diminished, as occasion may require, by raising or lowering the iron plate, by means of an iron pin: thus, the supply of air may be proportioned to the quantity of

smoke produced, and the whole of the latter will be advantageously used, before it can escape through the chimney. See also BOILLERS and FIRE-PLACES.

[A full account of Mr. Robertson's furnace with plates may be seen in the xi. vol. of TILLOCH'S *Philosophical Magazine*.]

Mr. John Roebuck of the Devon iron works, Scotland, from the successful result of an experiment continued for several months, was led to be of opinion, that all blast furnaces, by a proper adjustment of such machinery as they are provided with, might greatly and advantageously increase their produce, by assuming this as a principle, viz. " *That with the given power, it is rather by a great quantity of air thrown into the furnace with moderate velocity, than by a less quantity thrown in with a greater velocity, that the greatest benefit is derived, in the smelting of iron stones, in order to produce pig iron.*

FURNACE (AIR) This depends for its great heat on the height of the chimney. For the column of air, of which the chimney is a part, will be light in proportion to that height; and of course, the colder and heavier air will rush through the fire with proportional violence, to restore an equilibrium; and combustion becomes more rapid and intense, the more the air is decomposed.]

FURROW, in agriculture, a term not properly defined, as it has three or four distinct significations, namely, 1. The soil turned up by the plough; 2. The trench left by this operation: 3. The interval between two ridges; and, 4. The cross drain which receives the rain-water collected by these intervals. Dr. JOHNSON adds a *fifth*, but he obviously mistakes furrow for *drill*.

According to Mr. MARSHALL, there are three ideas which lay claim to the word FURROW:...... 1. The trench made by the plough, which may be called a *plough-furrow*; 2. The collateral drains, or an *inter-furrow*; and 3. The transverse drains, or the *cross-furrow*.

The proper formation and disposition of furrows, is an object of the first importance in tillage, to effect the complete draining of water. Hence, in plain fields, the rain-furrows ought to be drawn according to the declivity of the land: but, in rising grounds it will be most proper to direct them to that side which slightly deviates from the horizontal line.

It also deserves to be remarked, that in all situations where it is practicable, especially at the declivities of fields, reservoirs, or pits should be dug, or formed, in order to collect the drained water, together with the finest particles of earth, mire, and other ingredients of manure: after the water has subsided, these valuable materials might be easily obtained in a solid form, and thus again employed on the same field, without incurring the additional expense of carriage. We trust, judicious farmers will avail themselves of this hint, and not disregard it with the *stale plea of innovation*.

FURZE, or *Ulex*, L. an indigenous plant, consisting of two species, the principal of which is, the *Europæus*, COMMON FURZE, WHINS, or GORZE, which grows on heaths, road-sides, and pastures. It abounds particularly in the county of Cornwall, where it is very productive, growing to the height of six or eight feet; and

flowering from May till late in autumn.

Furze thrives in a light sandy soil, though it grows more luxuriantly in rich land. It is propagated from seed, which is sown in the months of February, March, and April, or in the beginning of May, in the proportion of 6lbs. to an acre ; either alone, or with barley, oats, or buck-wheat. But it is not mowed till the year after it has been sown, in the month of October, or somewhat earlier, when it will continue till Christmas, and be fit for use till March.

Furze will grow for several years, and produce from ten to fifteen tons per acre, which, in the feeding of cattle, are equal to the same quantity of hay : hence it is in some places regularly stacked.

This plant is of the greatest utility, especially as food for horses, which, when it is recently bruised, eat it in preference to hay, and even corn. Goats and sheep likewise feeds upon the tender tops. Cows also, that are fed with it, yield nearly the same proportion of pure and untainted milk, as when pasturing on meadow grass. For this purpose, the furze is crushed and reduced in a machine, consisting of a large circular stone, set on its edge, with a wooden axis passing through the centre. One end of this axis is fixed upon a pivot placed in the centre of a circular area, and at the other end is fastened a yoke, to which a draught-horse is attached. As the animal moves, the stone revolves round its axis in a circular groove, or trough of hewn stone, in a manner similar to sugar-bakers, or tanners'-mills. In this trough the whins or furze are placed, and bruized by the weight of the stone, as it passes over them : after being well crushed, they are raised up (by means of a three-pronged fork) in the form of a kind of matted cake, which being set upright, is again broken by the wheel revolving on its axis. Thus, the operation is continued, new surfaces being successively presented to the action of the wheel, till the whole is reduced to a soft pulpy mass. During the continuance of this process, however, it will be requisite to pour sufficient water on the furze, at different times, as, without such precaution, the plant could with difficulty be rendered soft enough to be eaten by cattle. To the furze thus crushed, chopped straw is sometimes added, in the proportion of 1 cwt. to a ton of furze..... This operation may be effectually performed by the mills employed in grinding apples, or expressing oil. But, in some parts of England, the prickly points of the whins are merely broken with heavy mallets on blocks of wood, and in this state given to cattle, which eat them eagerly.

Furze is likewise employed for heating ovens, as it burns rapidly, and emits a great degree of heat; when consumed, its ashes are used for a ley, which is of considerable service in washing coarse linen.

This plant is also eminently adapted to the formation of fences, especially on the banks of rivers ; as by its close and prickly branches it retains the collected earth, and is more easily procured than faggots. An instance of this fact, occurs in the 52d vol. of the *Philosophical Transactions of the Royal Society*, for the year 1761, where it is stated, that locks and *dam-heads* may be raised at one-tenth

part of the usual expense, by means of furze; for a thin perpendicular wall of stone and lime, or a wall of deal boards two inches thick, is the dearest part of the whole work. Close to such a wall, on the interior side, is formed a mound of furze, intermixed with gravel, six or seven yards in breadth; and a long beam, equal with the highest part of the mound, is laid on the top. It is affirmed that such a dam cannot be injured by the weight of the water, or the force of the current, nor will the pressure of the mud and gravel cause it to separate, as their weight is suspended by the intertwining of the furze. If, therefore, the beam on the top of the wall be fixed, the whole fence will be firm, and effectually prevent any accident that might happen from the bursting of the bank.

Another purpose to which whins or furze have been applied, is that of a *fence for hedges*. With this view, a bank should be raised five or six feet broad at the top, with a proper ditch on each side, the surface of which ought to be thickly sown with furze-seeds. These will quickly grow, and in the course of two or three years form a barrier, through which few animals will be able to break: such a fence will continue in a state of perfection for several years. But, as the furze advances in size, the old prickles decay; thus leave the lower part of the stems naked, and afford a passage to animals. To remedy this inconvenience, the bank ought progressively to be stored with new plants, which should never be allowed to ascend to such a height as to become bare below; so that if one side of the hedge be cut down close to the bank, the other half may remain as a fence till the former attains a proper size; when the opposite side may be cut down in a similar manner. Thus, the bank will continually have a strong hedge upon it, without ever becoming naked at the root. Lastly, the fresh and dried flowers of this plant afford, in dyeing, a fine yellow colour.

There is a variety of this species, which has, within these few years, been cultivated in England, and is called *French Furze*. It thrives on a poor sandy soil, and is cut every third year, in the month of February: the instruments should be sharp, and applied as closely to the ground as possible. An acre of land, sown with this furze, will yield between four and five thousand faggots, which are chiefly consumed in the heating of ovens.

FUSTIC, or Fustock, is the Dyer's Mulberry-tree, or *Morus tinctoria*, L. a native of the West-Indies, whence it is brought to this country. It is used by dyers in tinging cloths of a yellow colour; for which purpose it is allowed by the 8th Geo. I. c. 15, sec. 10, to be imported duty-free, excepting a convoy-duty of 7*d.* per cwt. It deserves to be remarked, that a small addition of common salt renders the yellow shade darker; sal ammoniac precipitates an orange-coloured powder, and the supernatant liquid has an *aurora yellow* appearance. Cloth dyed with this drug, without being previously impregnated with neutral salts, or alkalies, acquire a yellow colour of a brownish shade, which undergoes no change in the air; but M. Berthollet observes, that lustre and vivacity of colour can be obtained only, by preparing the stuffs with the usual solutions.

Ponner, a German chemist of repute maintains that alum, and solutions of tin, produce indeed a more lively tint, but which easily fades in the open air.

G.

GAD-FLY, or Breeze, *Oestrus bovis*, L. an insect with spotted wings, and a yellow breast. It has a long proboscis, with a sharp dart, enclosing two others within it.

These insects particularly infest oxen, in the backs of which they deposit their eggs, and where the maggots are nourished in the winter, till the month of June: during the whole summer, they plague the cattle by means of their darts to such a degree, that the distressed animals are induced to rush into the water for refuge, till night approaches. We believe that the washing of oxen and cows in the early spring, with a decoction of tobacco, or any other bitter and acrid plant, would greatly tend to prevent the generation of these vermin.

Gad-flies are also very destructive to flowers and trees, the juices of which they absorb; and likewise injure the roots of trees, which, if not timely prevented, they gnaw so severely, that the stem will languish, and at length perish. The only remedy hitherto discovered is, to dig up the soil at the foot of such flowers or trees, to kill the insects, and to lay on fresh earth; by which means the plants will be speedily recovered, if they have not been too long neglected.

GALBANUM, a gum that exudes from the stem of the *Bubon gummiferum*, L. or Gum-bearing Macedonian Parsley, a native of Persia, and different parts of Africa. The concrete juice is semi-pellucid, soft, and tenacious; of a yellowish-red colour; a strong smell; and a bitterish nauseous taste. The best sort is imported in pale coloured masses, which, when opened, apparently consists of clear white tears. This gum is of an emollient and resolvent nature; a tincture prepared of half an ounce of it, dissolved in eight ounces of proof spirit, of which one spoonful is taken every two hours, has been found serviceable in chronic asthmas, and inveterate coughs, where expectoration is required to be supported. It is chiefly employed externally, in white swellings, as well as obstructions of the abdomen, and frequently in the form of a plaster, though it is more efficacious in the liquid state. In hysteric spasms, and inflamed hemorrhoids, we are not acquainted with a better application; but, in the latter case, the painful parts ought to be previously covered with linen rags moistened in lime-water, before the tincture is dropped upon them.

GALE, the Sweet, Sweet Willow, or Dutch Myrtle,

Myrica gale, L. is an indigenous low plant, growing abundantly on bogs, in gravelly soils, and flowering in the month of May. It is eaten by horses and goats, but not relished by sheep and cows.

This plant was formerly, by the northern nations, used as a substitute for hops; but unless it be boiled for a considerable time, it is apt to occasion the head-ach. Dr. WITHERING is of opinion, that from the catkins of this vegetable, if gathered in sufficient quantities, good candles might be manufactured; as, upon boiling those parts in water, a waxy scum may be perceived to rise to the surface. In the currying of leather, especially the softer kinds, this shrub is of the greatest utility. When reduced to powder, it affords a grateful perfume in the composition of ointments; and BECHSTEIN asserts, that it is likewise serviceable for the expulsion of *moths* from clothes. The Norwegians smoke the leaves mixed with tobacco, which they are supposed greatly to improve. A decoction of the plant is used for the destruction of bugs and other vermin. In dyeing, the bruised flower-buds and seeds yield a yellow colour..... Lastly, an odoriferous essential oil may be distilled from this aromatic shrub.

The sweet gale may be propagated either by seed, or, more speedily, by the divided roots, which thrive in almost every kind of soil, if it be sufficiently watered.

There is another species of the gale, namely, the *myrica cerifera*, from which the inhabitants of Louisiana, [South-Carolina and Georgia,] prepare *myrtle candles*; it is also used for tanning calf-skins..... [See MYRICA.]

[GALEGA, a genus of plants, comprising nineteen species, of which the *G. Virginica*, L. only, will be here noticed. It is called *Virginian goats'-rue*, or *Cat-gut*; and is a beautiful plant. This species has a perennial root, which is also long, elastic, and tough: the stem is annual, and grows to a height of three feet. The whole plant is covered with a silvery down. The flowers are red, in spikes at the ends of the branches. The root used in decoction is a powerful remedy against worms.]

GALL, in natural history, signifies any protuberance, or tumor, produced by the punctures of insects on plants and trees of various kinds; but especially the *quercus*, or oak; *cistus*, or rock-rose; *glechoma hederacea*, or ground-ivy; *salix*, or willow; *hieraceum*, or hawkweed; *salvia*, or clary; *veronica*, or speedwell, &c.

Insects deposit their eggs in the leaves or tender branches of plants, the juice of which exudes, and in a short time forms tumors around the punctures or holes. The external coat of this excrescence is dried by the air, and during the winter affords a secure shelter to the inclosed insect, while the soft inner pulp furnishes it with sustenance till the spring approaches, when the fly perforates the shell or rind, and departs.

The best of these galls are those found on oak-trees, and which are thence called *oak-galls*; they are deposited by the *cynips quercus gemmæ*, or oak-bud cynips. A small portion of galls infused in a weak solution of vitriol and water, imparts to it a purple or violet tint; which, after the whole of the colouring matter is extracted, becomes perfectly black. Consi-

derable quantities of this drug are used in Britan, for the making of ink, dyeing clothes of a black colour, and also for the dressing of leather. The most esteemed galls are brought from Aleppo in Syria.

Galls have an austere styptic taste, without any smell: they are very powerful astringents, and have, therefore, often been employed in medicine. It is asserted that, by their internal use, in doses of half a dram or more of the powder, intermittent fevers have been cured, even after Peruvian bark had failed.

GALL, in *Sheep*, denotes a disorder, with which these animals are affected during the winter, and which is probably occasioned by severe frosts.

Although we have met with no remedy for the cure of this complaint, yet for its *prevention*, the following useful fact deserves to be recorded. Mr. ELLMAN, of Shoreham, Sussex, has observed, that by giving his sheep some hay in mornings of hoar-frosts, it preserves them from the *gall*.

GALLING of a HORSE'S BACK, an injury occasioned by heat, and the chafing or pressure of the saddle. To prevent this painful affection, it is recommended to take the skin of a hind, well furnished with hair, and exactly fitted under the pannel of the saddle, with the hairy side next the skin of the horse.

When, on a journey, a horse's back happens to be galled, a little of the stuffing of the pannel, near the swelled part, should be taken out, and a piece of soft white leather stitched over it, to supply the deficiency. Besides, the sore part of the animal's back should be dressed every evening with an ointment made of the white of an egg and a little powdered alum, beat up together till it acquire the consistence of honey; but, previous to its application, the injured part must be carefully washed with cold water and soap...Ignorant farriers, in such cases, generally apply *salt butter*, and strew likewise common salt on the horse's back, to remain there, over night. We, however, are convinced from experience, that such practice is hurtful, and that *fresh* hog's lard, or butter, is preferable. In situations where alum cannot easily be procured, a rag dipped in lime-water, or vinegar, may be substituted with equal advantage.

GALLING in Medicine. See EXCORIATION.

[GALLIUM TINCTORIUM, A native plant of North America, possessing the very valuable property of dyeing a red.

It has six linear leaves on the stalk, and four on the branches; the stock is flaccid, the peduncles are placed under the flowers, the seeds are smooth, the stalk of the plant is from six to eighteen inches high, the seed vessel is on the top, and comes to maturity in September; the roots are from one inch to two feet long, and when dried, as slender as a common knitting-needle; the outside of them is of a dark brown colour, the inside when broken, of a yellow, orange or red colour. It grows plentifully in woods, swamps and on the banks of rivers, in the middle and back parts of Pennsylvania, in Canada, Hudson's bay, and Western country. The roots of the plant should be carefully dried in the sun, and great precaution taken to preserve them from moisture, that they may not mould.

According to the late Dr. H. MARTIN, the Indians fix the colour by the juice of the crab-apple, (*pyrus coronaria*). Governor St. CLAIR stated the same fact to the Editor. The Indians dye all their Porcupine quills, and the white hair of deer tails with the *gallium*....*Amer. Phil. Soc. Trans.* vol. 3. Dr. WOODHOUSE made some experiments upon this plant, which are detailed in the *Transactions of the Agricultural Society of New-York*, and observes "we see the dye on cloth and silk is durable; neither sun, air or moisture, nor any chemical agents, the alkalies excepted, change its colour"....There can be no doubt that the *gallium* might become an article of great consequence, properly attended to.

GALLIUM *Aparine*, L. See GOOSE-GRASS.]

GALLON, a measure of capacity, both for dry and liquid articles, containing four quarts, which varies according to the nature of the commodity measured. Thus, the wine-gallon contains 231 cubic inches, and holds 8 lbs. avoirdupois of pure water; the beer and ale gallon contains 281 solid inches, and 10 lbs. $3\frac{1}{4}$ oz. avoirdupois of water; and the gallon for corn, meal, &c. $272\frac{1}{4}$ cubic inches, and contains 9 lbs. 13 oz. of pure water. *Encycl. Brit.*

GALVANISM, an appellation given to the influence of metals, by mere external contact with the human body, discovered by Prof. GALVANI, at Bologna, about ten years since, and which he called *Animal Electricity.*

Certain convulsive motions on the nerves of living and dead animals, may be excited by the application of metallic or other conductors of electricity; but these motions may also be induced, by simply touching the animal fibre with two *different* metals, that are brought in contact with each other at the same moment. This surprizing phenomenon has lately been resorted to, in order to ascertain whether a drowned, suffocated, or otherwise suddenly deceased person, was really or apparently dead. For this purpose, Dr. CREVE, Prof. of Medicine in the *University of Mayence*, has contrived an instrument formed like a bow, both ends of which are furnished with two small round plates. The whole is composed of two parts made of different metals; one-half of solid zinc, the other of fine silver; or gold and zinc, or lead, tin, and gold. The proportion of the first metal should be less than the other combined with it; namely, the weight and size of the zinc-plate should be less than the opposite one of gold. Both plates are only screwed on the bow, which chiefly consists of silver. But, where this instrument cannot be procured on the spur of the occasion, a small piece of tin or lead, and a silver coin of a moderate size (for instance a shilling, or half-a-crown piece) may be substituted. Although any part of the body may be fixed upon for making the experiment with persons apparently dead, yet the upper arm will be the most proper. The skin, however, in that part where the incision is made, ought to be sound, and not of a gangrenous appearance. The muscles must be cleared of all fat and cellular texture, as far as this be practicable; and the blood is to be taken up by a sponge dipped in water. Next, the muscle should be slightly extended, by

stretching the arm; and, in order to keep the lips of the wound separate, the skin ought to be expanded, and the muscular fibres clearly exposed. After these preparatory steps, either the instrument above described, or two loose metallic plates, are to be applied towards the centre of the hollow place or wound made by an incision, and both flat places brought into perfect contact with the bare muscular fibres. If any irritability exist, or remain, in the system of the subject, the muscular fibres will be contracted and twisted in a manner similar to spasms; or convulsive motions will be evident: every symptom, however, disappears on withdrawing the instrument, and again becomes manifest on re-applying it as before. But no motion whatever will be perceptible, if all irritability be lost or destroyed, in which case the body may be considered as *irrecoverably dead.* In those instances, where persons have been deprived of life by intense cold, a moderate degree of warmth should be previously applied, with a view to render the limbs flexible. Hence, this experiment cannot with propriety be undertaken, till all other means (see FROST,) of restoring animation have been *unsuccessfully* employed.

Whatever two metals be chosen, they will, with a few exceptions, produce those remarkable contractions, when applied in the manner before described; but the most powerful are, zinc and silver, or zinc and gold; or in general, zinc, tin, or lead, when used in combination with gold, silver, molybdena, steel, or copper.

These singular phenomena take place in consequence of a mutual communication between any two points of contact, whether more or less distant, in a system of muscular and nervous organs. The extent of this communication may be considered as a complete circle divided into two parts; one of which, comprising the organs of the animal under the experiment, is called the *animal arc;* the other, which is formed by the metals or *galvanic* exciters, is denominated the *excitatory arc;* and consists of more than one piece, of various kinds.

Beside the effects thus produced on the muscles, the impressions made on the organs of sense are equally remarkable. And as the experiments illustrating them may be easily repeated, we shall specify some of the most interesting. For instance, if a thin plate of zinc be placed on the upper surface of the tongue, and a half crown, shilling, or silver tea-spoon, be laid on the lower surface of the tongue, and both metals after a short space of time be brought into contact, a peculiar sensation similar to taste, will be perceived at the moment when the mutual touch happens. If the silver be put beneath, and the zinc upon the tongue, the same sensation will arise, but in a weaker degree, resembling diluted ammoniac, from which it in all probability derives its origin.

If a silver probe be introduced as far as convenient into one of the nostrils, and then be brought into contact with a piece of zinc placed on the tongue, a sensation not unlike a strong flash of light will be produced in the corresponding eye, at the instant of contact. A similar perception will result, both at the moment of contact and at that of separation, if one of the metals

be applied as high as possible between the gums and upper lip, and the other in a similar situation with the under-lip, or even under the tongue. Lastly, when a probe or rod of zinc, and another of silver, are introduced as far back as possible into the roof of the mouth, the irritations produced by bringing the external ends into contact, are very powerful; and that caused by the zinc is similar in taste, to the sensation arising from its application to the tongue.

No method has hitherto been discovered, of applying the Galvanic influence in such a manner as to affect the senses of smell, hearing, and touch; though several eminent philosophers have carefully investigated the subject. Nor are the *causes* of these phenomena clearly ascertained; GALVANI and some of his followers, supposing them to depend on the electric fluid, while others attribute them to the influence of various physical agency.

In this state was Galvanism, when in the year 1800, Signior VOLTA, professor of Natural Philosophy, at Como, in the Milanese, communicated to Sir JOSEPH BANKS, a discovery of the vast accumulation of this power: it was accordingly presented to the *Royal Society*, from the 2d part of whose *Transactions*, for 1800, we have selected the following account.

Signior VOLTA's apparatus consists of a number of copper or silver plates (which last are preferable), together with an equal number of plates composed of tin, or still better of zinc, and a similar number of pieces of card, leather, or woollen cloth, the last of which substances appears to be the most suitable. These last should be well soaked in water saturated with common salt, muriat of ammonia, or more effectually, with nitre.... The silver or copper may be pieces of money, and the plates of zinc may be cast of the same size. A pile is then to be formed, by placing a piece of silver on a corresponding one of zinc, and on them a piece of wet cloth or card; which is to be repeated alternately, till the number required be arranged in regular succession. But, as the pieces are apt to tumble down, if their numbers be considerable, unless properly secured, it will be advisable to support them by means of three rods of glass, or baked wood, fixed into a flat wooden pedestal, and touching the pieces of metal at three equi-distant points. Upon these rods may be made to slide a small circular piece of wood, perforated with three holes, which will serve to keep the top of the pile firm, and the different layers in close contact. The moistened pieces should likewise be somewhat smaller than those of metal, and gently squeezed before they are applied, to prevent the superfluous moisture from insinuating itself between the pieces of metal. Thus constructed, the apparatus will afford a perpetual current of the animal-electric fluid, or Galvanic influence, through any conductor that communicates between the uppermost and lowest plate; and, if one hand be applied to the latter, and the other to the highest metal, a shock will be perceived, which may be repeated as often as the contact is renewed. This shock greatly resembles that given by the torpedo, or *gymnotus electricus:* and, according to the larger size of the metallic plates,

the shock will be proportionably stronger. The intensity of the charge, however, is so low, that it cannot penetrate the dry skin; it will therefore be necessary to wet both hands, and to grasp a piece of metal in each, in order to produce the desired effect: its power may be considerably increased, both by an elevation of temperature, and by augmenting the number of pieces that compose the pile. Thus 20 pieces of each will emit a shock, that is very perceptible in the arms; if 100 be employed, a very severe but tremulous and continued sensation will extend even to the shoulders; and, if the surface of the skin be broken, the action of the Galvanic influence will be uncommonly painful.

The sensation of a flash, or shock with this apparatus, does not materially differ from that produced by two simple plates; but it may be effected in various ways, especially if one or both hands be applied in a wet state to the lowest plate of the pile; or any part of the face be brought in contact with a wire communicating with the top piece. Farther, if a wire be held between the teeth, so as to rest upon the tongue, that organ, as well as the lips, will become convulsed, the flash will appear before the eye, and a very pungent taste will be perceived in the mouth.

Many other curious facts have transpired on this interesting discovery; but, as they have not been hitherto applied to medical purposes (though we believe that *Galvanism* may be safely, and perhaps successfully resorted to, in *paralytic* and other cases, where the muscles require excitement), we shall content ourselves with referring the curious reader to Dr. FOWLER's "*Essay on Animal Electricity*," 8vo.....for a further account of Signior VOLTA's discovery; to the volume of the "*Philosophical Transactions*" above cited; and to the 4th vol. of Mr. NICHOLSON's "*Journal of Natural Philosophy*:" and, for later discoveries, to the 1st vol. of Dr. GARNETT's "*Annals of Philosophy*," &c. 8vo. Cadell and Davies, 1801, where the subject is perspicuously treated.

GAMBOGE, a concrete vegetable juice, of a gummy-resinous nature. It issues from the *Cambogia gutta*, a native of Cambia, in the East Indies; whence it is imported in large cakes or rolls. The best sort is of a deep yellow colour; is divested of all smell; and has very little taste.

As a pigment, gamboge makes a beautiful yellow, which is much used by painters. When taken as a medicine, it operates violently both upwards and downwards. It has been used in dropsies with cream of tartar, or jalap, or with both, to accelerate their operation: it is also recommended to be taken for the expulsion of the tape-worm, in doses of fifteen grains, early in the morning; and, if the worm be not expelled in two or three hours, this powerful dose is said to have been repeated with safety and with success, even to the third time, and in persons of delicate habits. Great precaution, however, is requisite in the use of this precarious and active medicine; but, if accidentally too large a dose of it should have been swallowed, the most effectual antidote will be copious draughts of a solution of pearl-ashes in water.

GAME, in general, denotes any

sport or diversion that is performed with regularity, and subject to certain rules.

Games are usually divided into those of *exercise*, such as leaping, playing at tennis, &c. and into those of *hazard*, such as backgammon, &c. which latter ought, in justice to the persons addicted to them, to be completely abolished.

Having already treated of the more active games, under the article EXERCISE, we shall at present only point out such as are peculiarly detrimental to the health of children.

1. *Bending* of the head backwards should be carefully avoided, to prevent young people from tumbling over: besides, the muscles of the abdomen become thus unnaturally extended, and frequently dispose such hazardous adventurers to ruptures.

2. *Jumping* wantonly from, or to, a considerable height, ought to be either prohibited, or undertaken with the greatest caution, in order to avoid violent concussion, and sudden tension of the muscles. The juvenile sportsmen should, therefore, be taught to make such exertions with their knees somewhat inflected, as to reach the ground first on the points of the toes, and then gradually to drop on the soles of the feet.

3. Children are uncommonly fond of displaying their dexterity in *lifting* one another, and even weights far superior to their strength; a practice that ought to be seriously discouraged: for, while they are in such postures, every nerve is necessarily strained; respiration is impeded; and dangerous accidents may ensue.

4. All *partial exercise* tends to give the body a crooked form, and should therefore be allowed only at certain times, and with moderation; as, under these restrictions, it is even salutary; but, if continued to excess, it is attended with the most injurious effects. Hence it would be a judicious measure to teach youth, at an early period, the use of both arms alike, and to make them acquainted with such games as contribute to that purpose.

5. *Sedentary diversions*, and long standing, are extremely prejudicial to the straight growth of children; for, as the spinal column and legs are too feeble to support the additional weight of the reclining part of the frame, the vertebræ yield to one side, and often occasion incurable distortions.

If these precautions were more strictly observed, and both male and female children instructed to beware of dangerous postures and leaps, as well as of raising and carrying heavy burthens, how many fatal accidents might be avoided! Yet, we are by no means advocates for rendering them unnecessarily timid. There is a medium, which every prudent guardian will easily discover; and to this we would call the attention of parents....happy, if we could thus add our mite towards introducing more rational, and less hazardous practices.

GAME, among sportsmen, denotes such birds, beasts, or other eatable animals as are taken or killed by fowling or hunting. For its physical properties, the reader will consult the separate articles of DEER, DUCK, HARE, &c.

Different penalties have been imposed, by various acts of parlia-

ment, on all unqualified persons, who may be detected in taking away or killing game, or in keeping greyhounds and other dogs, together with engines for catching hares, or other game; but as they are too numerous to be specified here, we can only refer to the laws themselves, or to the abstract of the acts of parliament, published in *Kearsley's Tax-Tables*, 12mo. 1801.

GAMING, the art of playing any game of chance; for instance, dice, E O, and Pharo-tables, &c.

Gaming has at all times been regarded as pernicious to the morals of society, and is therefore prohibited under severe penalties. Thus, by the 16th CAR. II. c. 7, if any person lose by playing or betting, more than 100*l.* at one time, he is not compellable to pay it; but the winner incurs a forfeiture of *treble* the value, one moiety of which belongs to the King, and the other to the informer. By the 9th ANN, c. 14, all bonds, &c. given for money won at play, or lent for the purpose of play, are utterly void; and, if any person lose at one time more than 10*l.* he cannot sue the winner; or, if any one commit a fraud, and win more than 10*l.* or any valuable article, he is liable to be indicted, and incurs a forfeiture of five times the value; beside which, he is to be deemed infamous, and liable to suffer such corporal punishment as is inflicted in cases of perjury. By the 18th GEO. II. c. 34, the stat. 9th ANN is farther enforced; and, if any person is convicted of losing 10*l.* or 20*l.* at any sitting within twenty-four hours, he shall forfeit five times the sum. There are likewise various other penalties, which our limits do not permit us to specify....Domestic readers have neither leisure nor inclination to spend their valuable time in the iniquitous practice of *gambling*: and, as those idle miscreants of society who waste their days in *deep* games, at the *ultimate* expense of the industrious husbandman, are seldom detected or punished, it were sincerely to be wished, that our salutary laws could be more rigidly enforced. But little prospect remains for the suppression of that vile amusement, which has lately spread its baneful influence even among women of rank and fashion; since they find themselves encouraged and supported by a powerful phalanx, composed of great and wealthy, but unprincipled men, who consider their homes as gloomy abodes, in which they cannot devote themselves to every scene of riot and dissipation.

GANGRENE, [See MORTIFICATION,] an intense degree of inflammation, in which the part affected grows livid, soft, little sensible, and is frequently covered with vesicles containing ichorous matter. But, when the part becomes blackish, flaccid, easily lacerable, cold, insensble, and emits the smell of putrid flesh, so that the corruption quickly spreads, it is then called *sphacelus*.

Persons of a good habit of body are seldom affected by a gangrene; though, even in them, it may accidentally be induced by contusion, long-continued pressure, or by whatever destroys the texture of a part, and deprives it of its nourishment. Thus, in cold climates, severe frosts frequently occasion this malady, by impeding the circulation....In rheumatic constitutions, especially those advanced in years, the feet are first afflicted with pain.

while on the inner side of the small toes, livid spots appear, from which the skin soon separates. By degrees the foot swells, and the toes become mortified.

As soon as there is reason to apprehend, from the unnatural heat of the part affected, and the violence of the fever, that a gangrene will ensue, the patient ought, without loss of time, to apply for professional advice, as bleeding may perhaps be useful: meanwhile, his diet and other treatment should be similar to that prescribed under the head of INFLAMMATION.

When an inflamed surface assumes a gangrenous appearance, while the patient is weak, and the pulse low, it will be advisable to resort to a nourishing diet, together with the free use of generous wine, and whatever else is calculated to invigorate the system. Peruvian bark in powder is usually given, in as large quantities as the patient's stomach can support. According to later experience, however, musk conjoined with the volatile salt of amber, affords a still more powerful remedy, for checking the progress of gangrene: eight grains of the former, with five of the latter, have been administered in the form of pills, every three hours, with evident success, after the bark and valerian had been given without effect.

In gangrenes arising from intense frost, the parts ought to be immersed in very cold water, or rubbed with snow; for warm applications will be attended with speedy mortification. A similar pratice should be adopted, if the whole body has become torpid, or rigid, from the severity of the weather; but, in this case, the water ought to be gradually changed for some of a warmer temperature.... Frictions with salt will also be of considerable service; and, if the whole body be benumbed, it will be requisite to administer first a glass of cold wine, or other cordial, and afterwards some warm wine, either alone or with spices.

It, however, frequently happens, that a mortification takes place, though no efforts or attention be neglected. In such unfortunate situation, we can by no means approve of extravagantly cutting and dissecting the parts, as soon as they appear gangrenous; but, where the affection extends very deep, it will be beneficial to scarify the diseased spots, and to remove part of the putrid muscular fibre.

Various external applications have been recommended, as auxiliary means of curing a gangrene; but the following deserve a particular notice: Dr. HAHNEMAN has, with singular success, employed a strong decoction of oak-bark, namly, six ounces of it, in coarse powder, boiled in a quart of water till it is reduced to one pint: four or six double rags are dipped in it, and applied in a cold state to the diseased part, every half hour, but the compress must every time be made of *clean* rags....Others have, with equally good effect, resorted to gentle stimulants, generally consisting of a weak solution made of one dram of sal-ammoniac in two ounces of vinegar, and six of water: the degree of stimulus may be increased, or diminished, by varying the proportions of the salt.

Lastly, when a separation of the mortified part, and a discharge of the corrupt matter, have been effected, either by the use of external or internal remedies, the remaining sore is to be treated as a

simple purulent ulcer, and may be healed in the same manner.

[GAPS, a disease to which poultry are subject. The late Dr. A. Wisenthall of Baltimore, gives the following account of it: *Lon. Med. and Phys. Journal*, vol. ii. " There is a disease prevalent among the gallinaceous poultry in this country, called the *Gaps*, which destroys eight-tenths of our fowls in many parts, and takes place in the greatest degree among the young turkeys and chickens bred upon old established farms. I know not whether the same kind of fowls in England are liable to it, and therefore shall take the liberty to give you a brief account of it.

" Chicks and poults, in a few days after they are hatched, are found frequently to open their mouths wide and gasp for breath, at the same time frequently sneezing, and attempting to swallow. At first the affection is slight, but gradually becomes more and more oppressive, until it ultimately destroys. Very few recover; they languish, grow dispirited, droop and die. It is generally known, that these symptoms are occasioned by worms in the trachea. I have seen the whole of it completely filled with these worms, and have been astonished at the animal's being capable of respiration under such circumstances.

" They are of a reddish colour, and at first view, resemble the human *lumbricus*, (or round worm); but when examined, are materially different, When exposed to the microscope, they are found to have an orifice or mouth at one end, formed for suction; the other end, as far as I know, imperforated. Through the integuments is seen the intestinal tube, much convoluted, like that of the *lumbricus*.

" No effectual remedy is known against these destructive animals. I have indeed seen them drawn out of the *trachea*, by means of a feather, stripped from near its end, which is passed into the *larynx*, and twisted round till it engages one or two of the worms, which are extracted with it."]

GARDEN, a piece of ground, laid out, cultivated, and ornamented with a variety of plants, fruits, and flowers.

Gardens are generally divided into three classes: 1. The flower-garden; which, being designed both for pleasure and ornament, ought to be in the most conspicuous situation. 2. The fruit-garden, or orchard; and, 3. The kitchen-garden, which being calculated for utility, should be planned in more distant situations. The two latter, however, are at present usually combined, as they equally require good soil and exposure.

The principal circumstances that merit attention in the laying out of gardens, are situation, soil, water, and prospect, the most eligible of which we shall briefly state, referring the reader to the article Kitchen-garden, for a more particular account of the management of such ground as is designed for the supply of culinary vegetables; and to that of Orchard for the treatment of fruit-gardens.

1. The *situation* ought to be neither too elevated, nor too low: for if a garden be too high, it will be exposed to the attacks of the winds, which are very detrimental to trees; and, if it be too low, the dampness, the vermin, and venomous creatures which breed in

ponds and marshy places, contribute much to the unwholesomeness of the spot. It is true, as Dr. DARWIN has observed, that low situations are favourable in some respects, on account of their superior warmth, and of their being more sheltered from the cold north-east winds, which, in this climate, are accompanied with frost; and from the boisterous south-west winds, that are very violent, and during summer, frequently injure the more delicate plants, by dashing their branches against each other. But in low situations, Dr. D. adds, the fogs in the vernal evenings moisten the young shoots and early flowers of trees, and thus expose them to the injuries of the frosty nights which succeed them, and which they generally escape, when placed in more elevated ground. The best scite, therefore, is on a gentle declivity, especially if it abound with springs, and the land surrounding the house be level: for the air will then be temperate, and the water descending from the hill, whether from springs or rain, will not only contribute to fertilize the soil, but also supply fountains, cascades, &c. it will be farther useful for irrigating the adjacent valley, which, if the water be not suffered to stagnate, it will thus be rendered fruitful and salubrious.

2. A good *soil* is an object of great importance. This may be ascertained, by observing whether there be any heath spontaneously growing on it, or other weeds that indicate a poor soil. But if the land be covered with rich grass, fit for pasture, it will be advisable to investigate the depth of the vegetable earth, by digging holes in varions parts, 6 feet in width and 4 in breadth: thus, if $2\frac{1}{2}$ or 3 feet in depth, of good mould, appear on the surface, the soil may be considered as excellent. Good land must neither be too stony, nor too hard for the spade; nor too dry, damp, sandy, or too light; lastly, neither too stong, nor clayey, as such soils are ill calculated for gardens.

3. The next requisite is *water;* the want of which is one of the greatest inconveniences in gardening: nor should it be taken from cold springs; as river-water, or that from stagnant pools, is more proper, especially after it has been exposed to the rays of the sun during the day.

4. The *prospect*, though by no means an essential point, constitutes one of the greatest charms of a garden, which if it happen to occupy a low and confined situation, is not only disagreeable, but also detrimental to the health of those who spend part of their time in such places.

In laying out a garden, its size ought never to exceed the ability or wants of the proprietor. The beauties of Nature should likewise be diligently studied; as gardens will continue to please in proportion as they approach to her design. Hence the several parts ought to be sufficiently diversified; and the general disposition of them accommodated to the inequalities, as well as the different situations, of the soil. Nor should the number and species of trees and shrubs be disproportioned to each part; nor any objects that may conduce to ornament, be excluded from the view of the garden. Lastly, in designing these delightful spots, the constant aim should be to unite all that is natural, grand, and no-

ble. The curious reader, who is desirous to obtain more particular information, may, with advantage consult Mr. WHEATLEY's classical work, entitled "*Observations on Modern Gardening, illustrated by descriptions*," 8vo. 3*s*. 6*d*. which is calculated alike to entertain and instruct.

[The great want of Botanic gardens in the United States, particularly in the city of Philadelphia, the seat of medical science, is now severely felt, and ought to be instantly remedied. That legislature would do itself immortal honours, which would devote a few acres to this important purpose. Of so much consequence is this measure deemed in Europe, that it is said in almost every little free town in Germany, and in every province of the Batavian Republic, a botanic garden is established, and a person regularly appointed to take charge of it. In this garden all useful plants are placed, whether intended for medicine, or the arts, and it also serves as a source of instruction to those who wish to acquire a knowledge of that pleasing and highly useful study. At Glassnevin near Dublin, too, a botanic garden has been established for some years, and is now in a flourishing condition. It is under the direction of the *Dublin Society, for the Promotion of Arts*, &c. by which an account of it has been published.

Dr. HOZACK professor of Botany has lately laid the foundation of one at New-York; and it is to be hoped the laudable example will be followed in Philadelphia.]

GARGET, a disease incident particularly to black cattle: it is attended with a swelling of the throat, tongue, and the contiguous parts; and supposed to arise partly from over-heated blood, partly in consequence of eating poisonous herbs. To prevent an attack of this disorder, it has been recommended to bleed the animals in the spring. But, if it has already taken place, the mouth ought to be examined, and washed with vinegar. Others advise an incision to be made with a knife, below the tongue, in order to let out the blood and water; afterwards to wash the wound with a solution of salt and alum, in vinegar. This, however, appears to us a hazardous practice, of which we have had no experience.

GARGIL, a distemper in geese, which, by stopping the head, frequently proves fatal. To effect a cure, nothing more is requisite than to take three or four cloves of garlic, pound them in a mortar with sweet butter; then form them into little balls, and give them to the animal fasting; but no food should be allowed them till two or three hours after taking this remedy.

GARGLE, or GARGARISM, is a liquid form of medicines used in disorders of the mouth, gums, &c.

Gargles are peculiarly useful in sore throats and fevers: they are preferable to many other remedies that are given on the spur of the occasion, as they may be easily and expeditiously prepared. Thus a gargle for softening and cleansing the mouth and gums may be procured, by simply mixing a small quantity of barley-water and honey, acidulated with a little vinegar.

An *attenuating gargle*, consisting of 6 ounces of water, $\frac{1}{2}$ an ounce of honey, and a dram and a half of nitre, will be of considerable

service in inflammatory fevers and quinsies, and also for cleansing the tongue and mouth. A decoction of sage, sweetened with honey and sharpened with vinegar, is well calculated to answer a similar purpose. With the same intention, the late Sir JOHN PRINGLE recommended a decoction of figs in milk and water, with the addition of a little sal ammoniac, as an excellent gargle, especially for strangulations in the fauces.

In putrid sore throats, where the symptoms are urgent, the tendency to putrefaction is great, and the patient's breath offensive, the following composition will be found serviceable: Let 12 ounces of barley-water be mixed with 6 of bruised contrayerva-roots, while the former is boiling. The liquor is then to be strained off, and 2 ounces of white wine vinegar, 1 ounce of tincture of myrrh, and 6 drams of the best honey are to be added. If the parts surrounding the gullet happen to be affected to such a degree as to render it painful for the patients to employ this composition themselves, it may be injected into the mouth, by means of a small syringe.

An *emollient gargle* may be made, by boiling an ounce of marsh-mallow root, and two or three figs in a quart of water, till it is reduced to one pint, when the liquor is to be strained off: it is useful in fevers, where the tongue and mouth are parched, in order to soften those parts and to promote a discharge of the saliva. Lastly, the *common gargle* is prepared, by mixing 6 ounces of rose water, with ½ an ounce of syrup of Clove July-flowers, and acidulating this compound with spirit of vitriol: it is employed for cleansing the mouth and gums, and operates as a gentle repellent; though we believe a mixture of water and vinegar is not inferior to that elegant composition.

GARGUT, a distemper affecting all kinds of mamillary animals, especially cows when full of milk. It is occasioned by this fluid being coagulated in their bags or udders, so that it becomes corrupted and breaks out, discharging a noisome and ulcerating matter. The chief cause of the injury is owing to the neglect of milking, or *sucking down* in proper time; but may also arise from too high feeding. Cows and sheep, when thus affected, may be cured; because these animals are tractable, and will suffer the diseased parts to be anointed with emollient applications: remaining quiet, while their teats are gently drawn down. Instances have occurred of cows, which were, even after they had lost half their bags, recovered by the simple methods above mentioned, especially by gently squeezing out the corrupted milk from the two sound teats. But sows can seldom be cured, on account of their intractability; and their pigs will never relieve them by sucking, after they have once tasted the vitiated milk: hence they necessarily perish, in consequence of their unlimited high feeding.

GARLIC, or *Allium*, L. a genus of plants comprising 54 species, seven of which are indigenous: of these, the following are the principal:

1. The *Oleraceum*, Streaked Field-garlic, or Wild Garlic, which is perennial; grows in pastures, meadows, and among corn; and produces whitish-green blossoms in the month of July. It is eaten

by cows, goats, sheep, and hogs: ....the tender leaves of this species are usually boiled in soups, or fried with other herbs, and form an wholesome article of food.

2. The *ursinum*, Broad-leaved Garlic, or Ramsons, which is also perennial; grows in woods, hedges, and meadows; and produces large white flowers, that blow in the months of May and June. This species is eaten by cows, but it communicates its flavour to the milk and butter, to such a degree as to render those articles offensive during the spring. It affords an excellent remedy for dispelling rats and moles; nor will this plant suffer any vegetable set near it to thrive:...an infusion of it in brandy is esteemed, according to Mr. PENNANT, a good medicine for the gravel....The inhabitants of Kamtschatka find it of great service in removing the scurvy, even in the most advanced stages.

3. The *Schoenoprasum*, Chive, or Chived Garlic, abounds in meadows and pastures; and flowers in the month of June. It is propagated by parting the roots, and was formerly in great request as an ingredient in salads, during the spring; but it has been latterly neglected: its taste, smell, &c. are milder than those of the common onion.

Beside these species, which are but little cultivated, there is another, that deserves to be noticed, viz. the *sativum*, or Common Garlic. It is a native of Sicily, whence it has been introduced into our gardens....This is a very hardy plant, and will thrive in almost every soil or situation. It is propagated either by the roots or seeds: the former ought to be set in autumn, so that they may strike firmly in the ground before the spring; which is requisite to make them flower vigorously the ensuing summer. When raised from seeds, it should be sown on a border of common earth, either in autumn, shortly after the seeds are ripe, or in the succeeding spring: they require only to be kept clear of weeds; and, in the following autumn, may be transplanted to the spot where they are destined to remain.

Every part of this plant, but especially the root, has a pungent, acrimonious, and almost caustic taste, with a peculiarly strong, and, to many persons, offensive smell. Several nations, however, such as the Russians, Poles, and Hungarians, are very partial to it; and the Jews eat it to excess. Its odour is extremely penetrating and diffusive; and, when the root is taken into the stomach, its scent is communicated to the various excretions, and perspires through the pores of the skin....The juice of this pungent root may be employed with advantage, for cementing broken glass, china, or porcelain.

Garlic differs from the onion, only by being more powerful in its effects: they are both stimulants; assist digestion; relieve the bowels; expel flatulency; and are beneficial in disorders proceeding from too great a degree of viscidity; they also increase the appetite; and, as their stimulating properties are diffused over the whole system, they may be considered as useful condiments with the food of phlegmatic persons, or those, whose secretions are in a languid state; but their use may prove very pernicious to individuals who are liable

to inflammatory complaints, or in whom a great degree of irritability prevails.

The medical properties of garlic are various: it has long been in estimation as an expectorant in pituitous asthmas, and other pulmonary affections that are not accompanied with inflammation. It is also frequently of service in the dropsy; at the commencement of which it has been especially recommended by SYDENHAM, in the quantity of one or two drams in substance, for a dose....Externally applied, it blisters the skin. When made into an unguent, it is said to discuss cold tumors, and has been celebrated for its efficacy in cutaneous complaints: in certain states of deafness, a small clove or bush of the root, when enveloped in gause, or muslin, and introduced into the ear, has been found an efficacious remedy.

[*Method for preventing the taste of Garlic in Milk and Butter.*

The following plan is recommended, by a writer in the *Philadelphia Magazine* for 1798, for removing the garlicy taste from milk, and producing sweet, good butter, in place of that which is so generally considered as highly disagreeable.

"When the milk is new from the cow, pour one quart of boiling water to every gallon of milk; stir it through, and put the whole into broad shallow dishes, so that it will not be above two inches deep. Let these dishes be placed on an open shelf, that the vapour may pass freely and entirely away. When the milk has stood in this manner twelve hours, it may be put into the churn altogether, or only the cream, as may be most agreeable to the taste or practice of the operator. Milk from cows that have pastured on garlic, when managed in this way, will be quite sweet.

The plan here proposed is founded on analogous experience.

The feeding of cows on turnips communicates a disagreeable taste to the milk and butter; but in many parts of Britain, they make excellent butter from turnip fed cows, by a plan similar to the foregoing.

The bad taste of the turnip consists in some volatile substance, which is evaporated by the hot water. Garlic is much of the same nature, but probably more volatile. Biscuit baked from garlicy flour, has no taste of garlic; but soft bread or pudding of the same flour, retains it strongly, having both experienced but an imperfect evaporation."

WILD GARLIC is unquestionably the most noxious plant with which farmers are troubled. When once it has obtained entrance in a field it is exceedingly difficult to destroy, for being a bulbous root, it is very tenacious of life, and will spring up vigorously after having been smothered for two years by a plentiful crop of clover....Nothing short of a system of farming, which is able to destroy it while in a vegetating state, will banish it from a field. Such a system, the Editor has been favoured with by Mr. JOHN D. STEELE of White-Marsh township, Montgomery county; who successfully cultivates a large farm, and the Editor has the pleasure to state that nearly the precise plan laid down by Mr. S. was prescribed by Mr. Wm. WEST of Delaware county upon an application to him respecting the means of destroying this noxious plant.

"The loss which farmers sus-

tain, by the impossibility of selling but at a very depreciated rate, grain that has garlic mixed with it, or dairy produce, that is affected with its disagreeable flavour, and also the loss which results to them from the retardation of the growth of their crops, where this pernicious plant prevails, render its extirpation an object particularly worthy of attention. I do not presume to say from experience, that this desirable object is fully attainable, but I believe the mode of summer fallowing pursued by many farmers for that purpose, is illy calculated to produce its accomplishment.

If the increase of garlic proceeded only from its fructiferous stem, ploughing in the summer would doubtless prevent it, but this is far from being the case, as the lateral progeny which grows from the maternal bulb, is perhaps more numerous than the sexual progeny produced at the summit of the stem.

We all know that the germinating powers of garlic lie dormant from the latter end of the spring, till towards the termination of autumn, and a slight attention to its bulbs will convince us, that it receives little or no injury from exposure to the action of the atmosphere during that time ; indeed it is a prevalent opinion that bulbs shoot with additional vigour after being dried during the time that their germinative functions are suspended, and hence the practice of taking up tulips, small onions, hyacinths, &c. when their foliage or blades decay, and replanting them before they begin to shoot.... It is a fact also, which no one will pretend to controvert, that bulbs kept out of the ground, or from receiving nutrition during their springing season, will gradually dwindle away and die, which fact is strikingly exemplified in the plant we are treating of, for if it be ploughed up early in the spring of the year, those bulbs which are turned up and loosened from the surface of the ground, will in a short time perish inevitably. Some few however of the embryon plants, drawing nourishment from their parents, and receiving shelter from their exterior integuments, will, if ploughed into the ground again, too soon spring from their remains. But the greatest difficulty is in bringing the whole of the roots to the surface of the ground, and can only be effected by repeated ploughings, hence two, three, or four years, according to the state of the ground or the seasons, must escape before a field overrun with this weed, can be perfectly cleared from it : but I do not think this ought to discourage the cultivator, or deter him from attempting the destruction of this pest, for if he can give as much manure to his land as will cause it to produce three or four crops of oats, barley or spring wheat in succession, he will not sustain any loss.

It is not on mere theoretic reasoning that I have founded my opinion, of the impossibility of destroying this plant by repeated ploughings in the *summer*, and of the efficacy of *spring* ploughings, in producing its destruction ; for experience and observation have convinced me of both...I have frequently plowed fields that abounded in garlic early in the spring, sowed them with oats, and in the succeeding autumn sowed them with winter grain, in these fields I have invariably found garlic plants so

weakened, that few of them produced seed....In two instances I have ploughed land in the spring and fall, two years in succession, and sowed it with oats for the express purpose of destroying the garlic. In the first instance, I succeeded perfectly, I do not know that there is a single root of garlic in the whole piece, which consists of about 12 acres; whilst another section of the same field exactly in the same state which was left as a mowing piece, and highly manured, is nearly covered with this plant....My other experiment was not crowned with such complete success, but the quantity of plants left appear so trifling as scarcely to deserve notice.

When a field is once clear of this weed, I believe there will be little difficulty in keeping it so, if care be taken that it is not introduced with the seed or manure, for nature has been very sparing in furnishing it with the means of spreading itself: she has not given it the downy wings of the thistle to convey it into the circumjacent country; she has not bestowedupon it the adhesive properties of the burdock, to carry it to distant parts; nor has she communicated to it the elasticity of the *noli me tangere* to convey it from its native spot; but on the contrary, she has formed its seed heavy and destitute of every itinerant principle, so that, when ripe, it falls immediately to the ground, where it joins the numerous subterraneous progeny,and becomes the concomitant of the maternal bulb."]

GARTER, a ligature employed for fastening or tying up stockings.

Though the use of garters be sanctioned by custom and fashion, it is by no means to be recommended, either above or below the knee; for the parts compressed acquire an unnatural hardness; and every exertion, either in walking or riding, is attended with increased fatigue. Dropsies of the legs and thighs also frequently arise from this unsuspected cause; hence, likewise, many persons stumble, fall, and dislocate, or otherwise materially injure the knee-pan. Such are the inconveniencies attendant on the use of garters: they might, however be easily prevented,by simply fastening the stockings to the waste-band, by means of tape. Trifling as this alteration may probably appear, it is of real importance to all, especially to those who are troubled with swelled or ulcerated legs, as well as to invalids and valetudinarians in general: for we are fully persuaded that by the adoption of the expedient before suggested, many unfortunate accidents may be easily obviated.

[GAULTHERIA, a genus of plants, one species of which only is known to us as a native of the United States. It is called *Canadian Gaultheria*, or *Mountain Tea*, *Grouse-berry*, *Deer-berry*, *Ground-ivy*. It is a common and very small shrubby plant, with slender stems, having at their tops four or five oval ever-green leaves, which have been used as a substitute for Bohea tea; whence the name of Mountain tea. This tea has been used with success in alleviating the asthma.]

GAUZE, in commerce, is a thin transparent stuff,sometimes woven of silk, and sometimes only of thread. In preparing the silk for making gauze, it is twined round a wooden machine, about six feet in height, in the middle of which an axis is placed perpendicularly, with six large wings. On these,

the silk is wound off the bobbins, by the revolution of the axis; and, when it is thus placed round the mill, it is taken off by means of another instrument, and wound on two beams. The silk is then passed through as many small beads as it has threads, and is thus rolled on another beam, in order to supply the loom.

Gauzes are either plain or figured: the latter are worked with flowers of gold and silver, on a silk ground, and are chiefly imported from China....No silk gauzes can, during the present hostilities, be imported from either France or Holland: formerly they paid a duty of 21 per cent. on the value of the goods.....Within these few years, excellent silk and other gauzes were manufactured at Paisley, in Scotland; but, as this elegant article of luxury has lately much declined, the silk is now employed for other more solid purposes.

GEM, a general name applied to all precious stones, which are divided into two classes: 1. The *pellucid*, or such as are clear, elegant and beautiful fossils, extremely hard, and of uncommon lustre; 2. The *semi-pellucid* gems, which are found in small detached pieces, and are composed of crystalline matter debased by earth: they are, nevertheless, of great beauty and brightness, and somewhat transparent.

The value of gems depends principally on their *hardness* and *colour*. With respect to the former, the diamond is allowed to be the firmest, and can only be polished, or cut, by its own powder: next to it, the ruby, sapphire, jacinth, emerald, amethyst, garnet, onyx, jasper, agate, porphyry, and marble are classed in the order we have enumerated. The same classification prevails in point of colour: the diamond is universally esteemed on account of its brilliancy; the ruby for its purple; the sapphire for its blue; the emerald for its green; the jacinth for its orange; the amethyst for its carnation; the onyx for its tawney; the jasper, agate, &c. for their vermillion, green, and variegated colours; and the garnet for its transparent red.

The art of imitating gems is very difficult to be attained; and, as it can be practised only by those curious persons, who possess both leisure and means, we shall not enter into a detail. The same apology will apply to the imitation of what are called *antique gems;* many valuable impressions of which have been made by Mr. TASSIE: hence we cannot omit to mention Mr. RASPE's "*Account of the Present State and Arrangement of* Mr. JAMES TASSIE's *Collection of Pastes*," &c. 8vo. 1786, where the inquisitive reader will find an interesting subject judiciously treated and explained.

GENERATION, in physiology, implies the propagation of the species, whether in plants, insects, fishes, or other animals.

Having referred the reader to this article, under the head of "ANIMALCULE," (vol. i. p. 61), we are obliged only to explain the term, without entering into speculative theories, none of which has hitherto been sanctioned by general authority.

GENERATION, is also used, in Scripture, for *genealogy*, or the series of children issued from a common parent. More frequently, however, is the word generation employed at present, to sig-

nify an *age*, or the average period of human life. Hence we say, "to the third and fourth generation;" in which sense historians generally compute the space of about 33 years to each generation. Thus HERODOTUS divides a century, or 100 years, into three generations; a calculation that appears to be tolerably correct, from the latest results of political arithmetic.

GENTIAN, the COMMON, YELLOW, or RED; *Gentiana lutea, v. rubra*, is a native of the Alps, whence it was introduced into this country. It is, however, seldom cultivated in our gardens; the root, which is employed in medicine, being imported from the mountainous parts of Switzerland and Germany.

Gentian is one of the principal bitters of European growth, and has been found of considerable service in fevers, and those complaints which arise from weakness of the stomach, and acidity in the first passages. Some years since a poisonous root was brought to London among parcels of gentian, the use of which occasioned violent disorders, and, in two cases, death. This spurious root is conjectured to have been the *Aconitum anthora*, a species of the wolf's-bane, which may be easily distinguished from the gentian, by its smell, whitish colour, and want of bitterness; whereas, the true gentian is externally brown, and of a yellowish, or bright-red colour within; has no scent, and, at first, a sweetish, but immediately after, a very bitter and pungent taste.....The dose of this drug, in powder, is from 10 to 40 grains; though it is more frequently taken as the chief ingredient in bitter wines; tinctures, and infusions.

[There are several species of *gentian* in the United States. Dr. SHOEPF particularly praises a low species, with narrow leaves, which he found in the *glades* in Pennsylvania.

GERANIUM, *maculatum* or *Cranes bill*. "In the county of Lancaster" according to Dr. BARTON, "and probably in other parts of Pennsylvania and the United States, this plant is known by the English name of "Crow Foot." It is hardly necessary to say, that this name is improperly applied to this or any other species of the family of *geranium;* for it has, long since, been appropriated to the different species of the genus *Ranunculus*.

The name of Crow-foot is also bestowed, in some parts of Pennsylvania, upon a species of *geum* or *Bennet*, the *geum rivale* or red water avens."....These remarks furnish an additional argument in favour of the importance of calling plants by their botanical, instead of their trivial names.

The *geranium maculatum*, is a common plant near Philadelphia, and flowers in the spring: it is a powerful astringent, and will stop very violent bleeding. Mr. BARTRAM informed the Editor that he stopped a most profuse hemorrhage in the ancle, which had been cut with an adze, by applying this plant to the part. From the pulsatory motion of the blood, there could be no doubt of a small artery having been divided.

The root boiled in milk is a common domestic remedy for the cholera, a bowel complaint which attacks children during the summer

months. Dr. WILLICH notices the *geranium* under the article "CRANES BILL."]

GERMANDER, or *Teucrium* L. a genus of plants consisting of sixty-eight species, three of which only are natives.

1. The *scorodinia*, Wood Germander, or wood sage, which is perennial; grows in woods, heaths, thickets, and hedge-banks; and flowers in the month of July. It has a bitter taste, and in smell resembles hops, with a small mixture of garlic: in the Isle of Jersey, it is used in brewing, as a substitute for hops.

2. The *scordium*, or Water Germander, which is also perennial; grows in damp and marshy situations; and produces purplish flowers in the months of July and August. It is eaten by sheep and goats, but refused by horses, hogs, and cows; though the latter will eat it when impelled by hunger, in consequence of which, their milk acquires the flavour of garlic. The fresh leaves of the water germander are bitter, and somewhat pungent: when pulverized, they have been used for the expulsion of worms:....a decoction of the whole plant is said to be a good fomentation in gangrenes.

3. The *chamædrys*, or Common Germander, is found in the borders of corn-fields that are remote from houses, in ruins, and upon ancient walls; it produces reddish purple flowers, which blow in the month of June or July. The leaves and tops of this species have a moderately bitter taste, accompanied with a weak aromatic flavour. It was formerly in great esteem as an aperient and corroborant; it is strongly recommended in agues, rheumatism, and gout, especially to weak and relaxed constitutions. In tanning, it has been employed with advantage by BAUTSCH.

There is an exotic species of the germander, viz. the *Teucrium marum*, or marum germander, which is a native of Spain, whence it has been introduced into our gardens, under the name of *Cat-thyme*. It has received this appellation, from the uncommon fondness which cats instinctively display for this vegetable. Its leaves and tender branches, on being rubbed between the fingers, when fresh, emit a volatile aromatic odour, which excites sneezing; but to the taste they are somewhat bitter, with a sensation of heat and acrimony.

From the active powers of the marum germander, it has been highly recommended in many diseases that require medicines of a stimulant, aromatic, and deobstruent quality.

In the second volume of the "*Transactions of the Royal and Economical Society of Florence*," we meet with an interesting memoir by Dr. MENAUBONE, on the medical properties of the COMMON GERMANDER. Our limits permit us only to state, that Dr. M. strongly recommends the leaves and shoots of this indigenous plant as a substitute for the Peruvian bark; a hint which deserves the attention of medical practitioners.

GERMANDER, the WILD, or GERMANDER-SPEEDWELL, *Veronica chamoedrys*, L. an indigenous perennial plant, growing in pastures and the sides of hedges; and flowering in May. It is eaten by cows, goats, sheep, and horses, but refused by hogs. The leaves of this plant have been recommended as a substitute for *tea*; but it is chiefly used as a mild astringent.

GID, a distemper to which hogs are subject. It is occasioned by their feeding too eagerly on buck-wheat, clover, or other rich succulent plants; and is somewhat similar to the disorder in horses, called the *staggers;* as the diseased hogs are affected with violent giddiness, sometimes stumbling and falling at every step; at others, sitting on their haunches, they squeak for several minutes successively, with great violence. The only remedy hitherto known for the cure of this malady is, to drive the animals about for a considerable time (as they are too intractable to be treated *medically*,) by which means an abundant evacuation will be promoted, and they will be effectually relieved. It is, however, necessary to adopt this rough treatment, as soon as any of the first symptoms appear; for, if neglected, their intestines become inflamed; their bodies violently distended; and a painful death will be the consequence.

GILDING, the art of spreading, or covering any substance with gold, either in leaf, or in a liquid state.

This art was known to the ancients, though it has only within the last two or three centuries been brought to the highest degree of perfection. Consistently with our plan, we cannot enter into the various branches of gilding, the knowledge of which is confined to a particular class of artists; yet, as there are many who delight in making experiments, we shall subjoin a simple method, that may be easily practised, and will not affect the health of individuals.

Let gold be dissolved in *aqua-regia* (which see); in this solution pieces of linen should be immersed, then dried, and burnt to ashes; these should be finely pulverized, and rubbed on silver, by means of a wet linen rag, or more properly with a moistened piece of cork: thus, the particles of gold they contain will be deposited, so as to adhere firmly to the silver. The remaining ashes are next to be washed off, and the surface of the silver that does not appear gilt, is to be burnished with a blood-stone, till it acquires the colour of gold. This method, which is easy, and consumes a very small portion of gold, is usually employed for the gilding of trinkets, spoons, snuff-boxes, and other articles.

Gold is likewise used for ornamenting glass, porcelain, and other vitrified matters; to the surface of which (being very smooth, and susceptible of a perfect contact), the gold leaves closely adhere. The pieces are then exposed to a certain degree of heat, and slightly burnished, in order to give them lustre.

However ingenious and pleasing to its amateurs, the art of gilding is very detrimental to the health of the persons who practise it, especially in the more complex branches where mercury and other noxious minerals are employed over fires, and cannot fail to produce the most pernicious vapours. Gilders by profession are particularly liable to suffer from these exhalations, the influence of which, however, might be effectually prevented, by allowing a continual current of air to perflate the apartment, where the process is managed. Such an arrangement may be easily made, by merely opening the *upper window*, or a door, which will admit fresh air to pass through the room. By this simple expedient, the tremors,

paleness, and sickness usually attendant on such operations, will be completely averted.

[The following expeditious and excellent mode of gilding is communicated by Mr. SAMUEL FOLWELL, minature painter of Philadelphia.

"Give your wood two coats of parchment size, and when dry, give one coat of a black composed of *asphaltum* boiled in turpentine: then lay your gold leaf on, and in 3 hours after, you may burnish."]

GILEAD, the BALSAM, or BALM of, is a gummy substance that exudes from the bark of the *Amyris Gileadensis v. Opobalsamum*, L. a native of Arabia Felix.

The balsam formerly imported into Europe, is obtained chiefly by incision; but the quantity afforded by one tree is so very small, and the collecting of it is attended with so much trouble, that the genuine balm is seldom, and perhaps never exported in a commercial way. It is of a bitterish aromatic taste, an acidulous fragrant smell, and of a yellowish or greenish colour....... Among the Turkish women, it is in high reputation, both as a cosmetic and as a specific for almost every disorder; on which account it is valued at so extravagant a price, that it is extremely difficult to procure it in a genuine state, because it is presented only to Sovereign Princes. Hence, in this country, it is now entirely superceded by the balsams of Canada and Copaiba, which are equally efficacious. We have inserted this account, with a view to caution and undeceive the credulous, who may be apt to imagine that *any* base compound offered to the public, under specious pretensions, is the real *Balm of Gilead*, which is frequently mentioned in Scripture.

[A contemptible Jew Mountebank, by name SOLOMON, resident at Liverpool, who has purchased the title of M. D. from Aberdeen, has puffed off a medicine which he calls "*Balm of Gilead*," as an universal restorer of exhausted constitutions, and has continued to dupe thousands by his disgusting pretensions, and by the abominable publications which bear his name. To the honour of the American name, such creatures would starve in the United States. Some of this medicine, is however, occasionally offered for sale among us, at the *moderate* price of $3 per oz. vial; but there is little demand for it. The good sense of our countrymen is strongly depicted in this circumstance.]

GILL. See GROUND-IVY.

GIN, sometimes called GENEVA, or HOLLANDS, is a malt spirit distilled a second time with the addition of juniper-berries.

These berries were at first added to the malt before it was ground; so that the spirit obtained from both, by distillation, possessed the aromatic flavour of the berries, and was much superior to that produced by any other method. At present, the juniper-berries are totally omitted; and the noxious spirits vended under the name of *gin*, acquire their flavour by distilling them with oil of turpentine, the taste of which in a slight degree resembles that of the juniper-berries, but possesses none of their valuable properties.

[GIN, commonly called Jenny. A machine to free cotton from seeds. Various machines under this name have been invented, some of which go by water or horses, and some by hand; an account of these may be seen in "DRAYTON's view of South Carolina" just published,

8vo. At present we shall describe a foot gin in use in South Carolina, and of which a drawing has been procured through the friendship of a correspondent, who observes, that "this gin differs from the common foot gins, in having iron instead of wooden rollers; it also works with greater ease, and its rollers appear to have twice the velocity of those in common use. The inventor asserts he can gin sixty-five pounds of cotton per day."

Explanation of the movements of the improved cotton foot gin.

A A. Two perpendicular wheels. B the axis, on which is a crank C turned by a treadle D with the operator's foot. The wheels are each armed with a triple fly, loaded at the extremity of each arm with leaden weights of about 4lbs. each. E a leather strap, which turns the collars FF of the two iron rollers, and for the purpose of turning them contrary ways, the strap on one side is reflected or twisted, and a small spindle G, turning freely ou its axis prevents the friction of the same. H H are two steel screws to regulate the distance which the rollers are to be apart. I is a moveable table with elevated sides on which the cotton is placed to be ginned, and resting on two arms K. This table in the back view of the machine is removed to shew a diagonal trough L, which receives the seed separated from the clean cotton. The cotton is extricated by the operator from the rollers, and falls over a platform placed on the braces M and is received on a broad foot board N, in the front. O is a high seat on which the operator is seated. P, Q, are mortises in the upright shaft, in which are inserted metal collars for the axis B to run in, and are regulated by wedges, as shewn in the plate.

As this gin is particularly calculated for families who raise cotton for home manufactures, the inhabitants of Kentucky, Tennesee, Ohio and Mississippi Territory, (in all which states it is understood no gins are yet introduced) will derive great benefit from the opportunity now offered them of constructing a machine which will greatly diminish their labours.]

GINGER, the Common, or *Amomum Zingiber*, L. is a native of the East Indies, whence it was transplanted by the Spaniards to the West India Islands, from which Europe is chiefly supplied with its spicy root.

Ginger is a perennial shrub, which grows about a yard high. Its propagation is effected by parting the roots in the spring, planting them in pots of light rich earth, and placing them in a hot-bed of tanner's bark, where they are to remain.

The dried roots of this plant are either white, from the lime employed to prevent their destruction by vermin; or blueish, brown, or black, according to the soil in which they have been cultivated; they are of eminent use, both for culinary and medical purposes, affording one of the most wholesome and agreeable spices. Hence ginger in entire pieces is often boiled in beer, and drank by persons who are obliged to spend part of their time in cold, open air. It is more immediately serviceable in cold flatulent colics; in laxity and debility of the stomach and intestines, especially in torpid, phlegmatic constitutions; in order to induce a brisker action of the vessels; for it is

Front View of a Cotton Gin

ate 3.

Back View of a Cotton Gin

not so heating as the spices of the pepper kind, though its effects are more durable.

GINGER-BREAD, is a composition prepared of flour, and sugar or treacle, to which is added a certain proportion of ground ginger, whence it has received its name.

Ginger-bread, well baked, may occasionally be of service to travellers, if a small portion of it be taken early in the morning, and on an empty stomach ; but it ought seldom, or very sparingly, to be given to children, whose stomachs it materially injures, especially when ornamented with *leaf-gold*, as it is erroneously called ; though the glittering bait consists of *Dutch gold*, that is, brass or copper reduced to the fineness of gold-leaf, and which is one of the most vehement poisons. From this fruitful source arise gripes, obstipations of the bowels, obstructions of the mesenteric glands, and other fatal disorders that frequently torment infants, and which there is great reason to fear, have carried many helpless victims of indulgence to an untimely grave. Parents, therefore, cannot be too watchful in this respect ; and it were much to be wished, that the pernicious practice of gilding ginger-bread might be prohibited, by public authority.

[GINGER WINE. A correspondent forwards the following receipt for making a pleasant ginger wine, which he recommends from experience.

To 20 galls. of water add 80lbs. honey, or 70 lbs. sugar, the former in preference : boil and skim as the feculent matter rises ; put the mixture into an open head, and add ½ ounce of ginger coarsely ground or bruised, to every gallon of the mixture, and when cooled, ferment and proceed as in elder wine, adding to every 10 gallons, when bunging close one fourth of brandy ; and if the flavour of the orange is required, proceed as in CURRANT WINE.]

GINSENG, or *Panax quinquefolium*, L. is an exotic plant growing wild in North America.

The dried root of ginseng, as imported into this country, has a mucilaginous, sweetish taste, similar to that of liquorice, but accompanied with some degree of bitterness, and a slight aromatic warmth, with very little odour. The Chinese ascribe extraordinary virtues to this plant, and consider it as a sovereign remedy in almost every disease to which they are subject. No proofs, however, of its wonderful efficacy have occurred in Europe. Nevertheless it is often used as a tonic, antispasmodic and stimulant, in doses from 20 to 60 grains, in powder. Nor do we believe that the celebrated *ginseng tea* possesses any peculiar properties, excepting those of a nauseous taste and loathing, while the warm water swallowed with it debilitates the stomach.

[This well known plant is the only native production of the United States, which answers to export, in order to procure the luxuries of CHINA. It is not much esteemed in China, unless clarified, except in times of a great scarcity of the plant. When however well clarified, it has brought the extravagant price of $100 per lb. and great wealth has been acquired by some early adventurers from Philadelphia. The process of clarifying, though hitherto kept a profound secret, consists in the careful application of heat and moisture to the fresh roots, and after-

wards dipping them in hot rice water, or a solution of isinglass in water. It is observed, that not more than one root in twelve will clarify. This plant grows abundantly near Philadelphia.

The Chinese attribute almost miraculous powers to ginseng. In particular they suppose, it possesses the property of preventing the effects of old age, and in preserving their virility to a late period. Medical men in Europe and the United States do not ascribe any virtue to this plant; but Mr. PENNANT shrewdly remarks, that it is very extraordinary, a nation so acute as the Chinese, should continue to use it for so long a period, and still believe in its good effects, and therefore he cannot be persuaded but that the plant must possess some of the properties attributed to it by the Chinese.]

GLADIOLE. See Flowering RUSH.

GLADWYN, or Gladdon. See Stinking FLOWER-DE-LUCE.

GLANDERS, a disorder in horses, which manifests itself by a corrupt slimy matter running from the nose: according to the degree of malignity, or the continuance of the infection, the discharge is either white, yellow, green, or black, and sometimes tinged with blood.

The cause of the glanders is variously attributed, by some to an infection; by others, to a diseased state of the lungs, the spleen, or the brain. When the distemper has continued till the evacuated matter is of a blackish colour (which usually happens in the last period), it is conjectured to proceed from the spine: in this case, it is called the *mourning of the chine*.

Unless timely remedies be applied on its first appearance, the disorder becomes incurable. With a view, therefore, to prevent rather than to cure it, we shall briefly state the most likely methods of obviating the symptoms of this malady, on their first appearance.

If the lungs be the seat of the disease, as in the case when horses are first attacked with coughs, we cannot recommend a better treatment to be pursued than that pointed out under the article COUGH. But, if a swelling arise beneath the ears, jaws, or about the root of the tongue, proper and immediate applications should be made to procure a discharge and suppuration of the matter. When cough, difficulty of breathing, or a great degree of inflammation, accompanies such swelling, it will be advisable to draw a little blood from a distant vein, in order to mitigate those symptoms: and, when the swellings about the parts have acquired an evident prominence, they should be fomented twice in twenty-four hours, for two or three days, with flannels dipped in the following decoction: Let a handful of chamomile, and a similar quantity of wormwood, marshmallows, and elder-flowers, be boiled in three quarts of water, for fifteen minutes, at the end of which they are to be strained. The liquor is to be used hot; and the herbs applied warm to the parts affected, by way of poultice.

In the course of two or three days, it may be ascertained whether a suppuration will follow; in which case the tumors increase in size, and feel soft in the middle, when pressed by the hand. This is a favourable symptom; but if the

swellings continue hard, without fluctuation, and are accompanied with a running from the nose, every precaution ought to be taken; as otherwise the disease may become troublesome. Hence it will be necessary to prepare a vapour-bath, consisting of rosemary, lavender-flowers, and sweet marjoram, a handful of each boiled in two or three quarts of water. This is to be put into a pail, and the animal's head held over twice a day, as near as can be borne, and for such a length of time as the vapour passing up the nostrils is supposed to operate in the manner of an internal fomentation. During the whole treatment, the horse's head ought to be kept warm, as it will greatly contribute to the discharge of the noxious humours.

In case the running from the nose continue to increase, becoming progressively more discoloured, the above stated vapour-bath should be continued, and the eight part of a pint of the following mixture injected into one or both of the nostrils, lukewarm, three or four times in the course of twenty-four hours: Take an ounce of linseed, half an ounce of chamomile-flowers, the same quantity of elder-flowers, and three pints of water. The whole is to be boiled for a few minutes and strained; but previously to its application, it ought to be properly mixed with four ounces of *Mel Ægyptiacum*, the recipe of which was given in the article FRUSH.

Should the discharge, at length, become so malignant as to afford reason to apprehend a caries of the bones, the fumigation and injection must be continued, and two or three drams of the following mercurial ointment rubbed into the glandular tumors, every evening, for a fortnight; cutting away all superfluous hair, that the mercurial particles may be more effectually absorbed, and carried into circulation: Take one ounce of crude mercury, and half an ounce of Venice turpentine; let them be mixed together in a mortar, adding a few grains of sulphur, to facilitate the union of the ingredients; then gradually mix with them two ounces of melted and lukewarm hog's-lard, and cover the vessel closely; the unguent being now fit for use. This is the last remedy that can be applied, with any prospect of success; and, if it unfortunately fail, the most rational farriers are of opinion, that the animal should be killed, without further delay; as the skin will then be its only valuable part.

GLASS, a solid transparent, brittle substance, produced by melting together sand, flint, alkaline salts, &c. besides which there, are various saline matters employed, namely, *Polverine*, or *Rochetta*, which is prepared from Glaswort, or *Salsola Kali*, an indigenous plant; but which is chiefly imported from the Levant, where it is cut down in the summer, dried in the sun, and burned in heaps, when the ashes fall into a pit, where they concrete into hard mass..... A similar salt is obtained from the ashes *(kelp)* of the *Fucus vesiculosus*, or Common Sea-wrack, or Sea-ware, a marine plant growing on the sea costs. The sand used in the manufacture of glass is found at Lynn, in Norfolk, and Maidstone, in Kent.

These various articles are first carefully washed, and, after extracting all the impurities, they are conveyed to the furnace in pots

made of tobacco-pipe clay, for the purpose of resisting the fire. Here the mixture is fused, and disposed of according to the different kinds of glass intended to be manufactured.

Round glass, such as phials, drinking-glasses, &c. are blown.... When the different materials are sufficiently liquefied, the workmen dip long iron pipes into it, and blow the metal till it lengthens like a bladder. It is then rolled on a marble slab to polish it, when it is blown a second time, in order to form it into the shape of a globe. Next, it is cut of at the *collet*, or neck, adhering to the pipe: for this purpose, the latter is rested on an iron bar close to the neck, and a drop of water poured on it, by which means it is cracked about a quarter of an inch, when it is slightly struck or cut by a pair of shears, and immediately separated. Now the workman dips the rod or pipe into the melting metal, whence he draw out as much as will connect the glass already made, to which he fixes the rod, opposite the opening caused by the breaking or cutting of the neck. In this position, the glass is carried to the mouth of the furnace, in order to be heated, or scalded: thus it becomes so soft, that it may be pierced, opened, and moulded at pleasure, without any apprehension of its breaking. The vessel, however, is not finished till it has again been returned to the mouth of the furnace, where, after being thoroughly heated, and turned quickly round, it will open to any size, by means of heat and circular motion. Should any impurities remain, they are cut off with the shears, as the glass continues flexible till it becomes cool. And, if the vessel thus made require a foot or handle, or any other ornament the operator forms them separately, and unites them by the help of hot metal, drawn from the pots with the iron rod:....the last operation for completing the glass, is that of ANNEALING...See vol. i.

Window or Table-glass, is worked nearly in the manner above described: the workman blows and manages the metal, so that it extends two or three feet in a cylindrical form. It is then carried to the fire, and the operation of blowing repeated till the metal is stretched to the dimensions required, the side to which the pipe is fixed diminishing gradually till it ends in a pyramidal form; but, in order to bring both ends nearly to the same diameter, while the glass continues flexible, a small portion of hot metal is added to the pipe; the whole is drawn out with a pair of iron pincers, and the same end is cut off with a little cold water as before.

The cylinder thus open at one end is returned to the mouth of the furnace, where it is cut by the aid of cold water, after which it is gradually heated on an earthen table, in order to unfold its length, while the workman with an iron tool alternately raises and depresses the two halves of the cylinder: by this process, the latter accommodates itself to the same flat form in which it is again heated, cooled on a copper table, hardened twenty-four hours in the annealing furnace, and afterwards preserved for use.

Window-glass is divided into various sorts, the principal of which are: 1. Crown-glass, which is the clearest and most expensive. The best window-glass, is made of white sand, 60lbs.; purified pearl-ashes, 30lbs.; salt-petre 15 lbs.; borax,

1lb. and of half a pound of arsenic. These materials are melted in the manner before mentioned, and if the glass should assume a dusky yellowish hue, a sufficient quantity of manganese must be added to remove that defect.

2. Newcastle-glass which is most commonly used in England: it is of an ash-colour, and frequently speckled, streaked, and otherwise blemished. Its preparation consists of 60lbs. of white sand, 25lbs. of unpurified pearl-ashes, 10lbs. of common salt, 2lbs. of arsenic, and 2 oz. of manganese.

3. Phial-glass is an intermediate kind, between flint and the common bottle or green-glass. The better sort is made of 120lbs. of white sand, 50lbs. of unpurified pearl-ashes, 10lbs. of common salt, 5lbs. of arsenic, and 5 oz. of manganese. The composition for green or common phial-glass consists of 120lbs. of the cheapest white sand, 80lbs. of wood-ashes well burnt and sifted, 20lbs. of pearl-ashes, 15lbs. of common salt, and 1 lb. of arsenic.

4. The common bottle, or green glass, is prepared from any kind of sand fused with wood-ashes, to which may be added the clinkers of forges.

Plate-glass is the last and most valuable kind, and is thus called, from its being cast in plates or large sheets: it is almost exclusively employed for mirrors or looking glasses, and for the windows of carriages....It is composed of 60lbs. of white sand cleansed; 25lbs. of purified pearl-ashes; 15 lbs. of salt-petre, and 7lbs. of borax; and, if a yellow tinge should appear in the glass, a small quantity of manganese and arsenic are added, in equal proportions.

Plate-glass was formerly *blown*, but that method having been found very inconvenient, *casting* was invented; namely, the liquid metal is conveyed from the furnace to a large table, on which it is poured, and all excrescences, or bubbles, are immediately removed by a roller that is swiftly passed over it.... It is then annealed in the manner already referred to.

The last process is that of *grinding*, which is performed by certain machinery, that is not generally known. In Britain, it is practised to the greatest perfection by Bohemians.

The *colouring of glass* with various shades, is an art known only to a few persons, and as it is not an object of domestic economy, we shall only notice a patent granted in February, 1778, to Mr. John Kent Tarrant, for his invention of painting, spangling, gilding, and silvering glass....This is effected by applying the painting to the back of the glass, so that it may appear on the front, when finished: the colours are to be prepared with oil or varnish. Those parts which are intended to be gilt, must be previously traced on the glass, and when perfectly dry, the gold-leaf is to be applied: a similar method is to be followed for silvering. With respect to spangling, the patentee directs this process to be performed after the parts have been properly shadowed; and, as soon as the outlines are dry, the glass ought to be varnished with a solution of gum copal, and the spangles strewed on while it is wet; when they are perfectly dry, it is necessary to varnish them over two or three times.

Glass is so remarkably elastic, that if the force with which glass balls strike each other, be comput-

ed at 16, that with which they recede from their elasticity, will be nearly 15. Hence we have seen *glass wigs*, and even *glass brushes*, manufactured by Bohemian artists. If glass be exposed to the influence of dew, it becomes moist, which does not happen either with silver or any other metal. And if a goblet, or other drinking glass, be filled with water, and rubbed on the brim with a wet finger. it will impart musical notes, higher or lower, in proportion as the glass contains more or less of that fluid: it likewise possesses considerable electrical properties, and is therefore frequently employed in experiments on electricity.

Before we conclude this article, we cannot omit to take notice of the numerous accidents that frequently happen in consequence of persons inadvertently, or adventurously, swallowing fragments of broken glass. In such case, the safest remedy is to administer, as speedily as possible, large draughts of olive or other demulcent oils, by which the membranes of the stomach and intestines may be lubricated, and thus the injurious effects of the glass timely counteracted. If children, or other improvident persons, have cut themselves with glass, it is of the first importance to ascertain whether any particles of it have remained in the wound: these should, at all hazards, be immediately extracted by a skilful operator, as, without such precaution, the most dangerous consequences are to be apprehended, in parts thus injured.

For different methods of uniting *broken glass*, we refer to the articles CEMENT and GARLIC.

GLASS-WORT. See SALT-WORT.

GLAUBER's-SALT, a chemical composition, which is usually prepared by adding to sea-salt an equal quantity of oil of vitriol diluted with water, distilling off the marine acid, and dissolving and crystalizing the remainder.

These salts may also be obtained by mixing four ounces of borax with one ounce and one dram of oil of vitriol; the whole of which, when sublimed, affords what is by chemists called *Sedative Salt*; and if the remainder be exposed to a strong fire, it will yield Glauber's-salts. They were first prepared by JOHN RHODOLPHUS GLAUBER, a celebrated chemist of the 17th century; and are of considerable use in medicine as cooling purgatives, when taken in doses from six to twelve drams: they also prove excellent aperients in various chronical disorders, such as habitual costiveness, for which small doses of one dram of this salt, with two scruples of cream of tartar, and one scruple of sal ammoniac dissolved in water, may be given with advantage, three or four times a day.

[The very disagreeable taste of this salt may be in a great measure destroyed, by dissolving it in hot lemonade.]

GLAZING, signifies the coating or enamelling of earthen ware with any vitreous substance, the basis of which consists of lead. It is one of those familiar arts with which the ancients were doubtless better acquainted than our modern potters. The Roman urns discovered in Yorkshire, instead of being *glazed*, are covered on both sides with a fine varnish of a red coral tint, smooth, beautiful, and incomparably more durable than all our

earthen vessels; having withstood the effects of time for a long series of centuries.

On the coutrary, the glazing of all our earthen ware is very apt to crack,both from moisture and heat, being composed of *lead*, one of the most pernicious metals that could be devised for such important purposes. It is well known that lead is easily volatilized by heat, and readily decomposed by any vegetable acid: hence it has been affirmed by various eminent writers, that we are under the necessity of inhaling or swallowing, perhaps every day, a minute portion of a metal which is one of the slowest, but most destructive poisons, and lays the foundation of many fatal disorders, such as palsy, dry colic, consumption, &c. the remote cause of which has not, till lately, been suspected.

Although we are no advocates for spreading alarm,or exciting apprehension, yet there appears to be sufficient reason to believe that our *glazed* culinary vessels are a latent source of disease; and when fruit or acids be allowed to remain in them for some time, the liquors or substances thus preserved will necessarily acquire a very dangerous impregnation from the metal.

Instead, therefore, of describing the composition and process by which earthen vessels are usually glazed, we shall earnestly recommend various substitutes for *lead* to the attention of the public.

M. Westrumb, an eminent German chemist, was required by the government of Hanover to devise a less pernicious method of glazing earthen ware than was hitherto practised. In consequence of numerous experiments, he has at length published the successful result of several compositions, in which not a particle of lead was employed, and which in his opinion will prove an useful glazing for ordinary vessels.

First; 32 parts of sand; 11. 15. or 20 parts of purified pot-ash; from 3 to 5 parts of borax.

Second; 32 parts of glass (we suppose *flint-glass*;) 16 parts of borax; and 3 parts of pure pot-ash.

Third: 150 parts of crystalized Glauber's-salt, with 8 parts of pulverized charcoal, previously roasted, till it has acquired a grey colour; 16 parts of sand; and 8 parts of borax.

Another method of *glazing without lead* has been invented by M. Niesemann, a potter at Leipzig: it consists of half a pound of salt-petre, half a pound of pot-ash, and one pound of common salt. This composition is not very expensive, and said to produce an enamel not inferior to that prepared with lead. Professor Leonardi has investigated, and found it eminently useful. We trust, therefore, our potters will in future conscientiously desist from using that pernicious and slowly poisonous metal.

GLEANING, or Leasing, as it is called in some counties, is the gathering or picking up those ears of corn which are left after the field has been reaped, and the crop carried home.

This practice has lately been decided to be illegal; and so far as it respects those idle persons, whose sole occupation during the summer months, is to procure a scanty subsistence by *leasing*, the decision has been dictated by the soundest wisdom.

In some parts of the Continent, the farmers allow this privilege

only upon condition that the *gleaners* contribute their labour for one or two hours towards the housing of the crop. Such regulation is occasionally beneficial to both parties, especially on the approach of rain ; as the sheaves may thus be collected and loaded on carts, or otherwise secured by the aid of supernumerary hands, before the storm bursts forth, and perhaps damages the corn, by additional moisture. In consideration of their services, these voluntary labourers are permitted to glean for one or two hours, more or less, according to the time they have assisted, before others are suffered to enter the field indiscriminately.

GLOVE, a covering for the hand and wrist, which forms a considerable article of commerce.

Gloves are divided into various kinds, such as silk, thread, cotton leather, &c. The materials for the last-mentioned sort are the skins of kids, lambs, does, bucks, and other animals, the various manufacturing of which affords employment to a great number of families.

Although the most fashionable gloves, and those very generally worn, consist of leather, yet they are by no means the most healthy. Indeed, it is equally improper and unwholesome to cover the hands and arms with any other than woollen texture, which ought to be preferred by all females who are anxious to improve the complexion of those extremities....we are convinced from experience, that no cosmetics are so efficacious and safe as simple animal wool.

GLOW-WORM, the Female of the *Fire-fly*, or *Lampyris noctiluca*, L. is remarkable for the light it emits during the night. This luminous appearance depends upon a phosphorescent liquor found at the lower extremity of the insect, which, by unfolding or contracting itself, withdraws it at pleasure.

The glow-worm flies about chiefly in autumn, and frequents the grassy plantations of juniper-trees. The whole insect was formerly used in medicine as a solvent of the stone, and highly extolled as an anodyne ; but it is at present deservedly exploded.

GLUE, a tenacious, viscid matter, serving as a cement to unite or connect substances together.

Glues are of different kinds, according to the various uses to which they are applied ; such are common glue, glove-glue, and parchment-glue : but the two last are more properly called Size.

The common or string-glue, which is chiefly used by carpenters, joiners, &c. is prepared sometimes from the whole skins of oxen, cows and other animals; but more generally from the parings or scraps, sinews of the legs, &c.

The parings are steeped for two or three days in water, when they are washed out, and boiled to the consistence of a jelly, which is passed, while hot, through osier baskets, in order to separate the impure particles. It is then left to subside and filtrate: when all feculent matters are settled at the bottom, the jelly is dissolved and boiled a second time ; after which it is poured into flat vessels or moulds, whence it is taken out in solid masses, and cut into square pieces or cakes....Lastly, it is suspended in a kind of coarse net fastened to a frame, or strings, where it is suffered to remain till completely dry. The best glue for common purposes used in this country is generally imported from Ireland, and is,

exempt even from the convoy-duty; whereas the glue obtained from foreign markets pays to the customs 9*s*. 3*d*½. per cwt.

A very superior, but expensive glue may be prepared from the hides of the oldest castle, especially those of bulls. Its quality is likewise much improved by long keeping; and its strength may be easily determined, by immersing a piece in water for three or four days; at the expiration of which, if it swell considerably without dissolving, and resume its former dry state, on being exposed to the air, it may be considered as excellent.

Glue is also manufactured from the skins, fins, heads, tails, and cartilages of porpoises, cuttle-fish, and other sea-monsters. For this purpose, the parts above mentioned should be boiled in water, being carefully preserved from smoke, and whatever may discolour the liquor, or render it turbid. When all the substance of the fish has been boiled down, the jelly is strained through a sieve, and suffered to cool. It is then again boiled with the same precaution, till the drops, when dried in the open air, concrete on cooling. After having acquired a proper consistence, it is twisted in a manner similar to paste, and suspended on strings for drying in the shade. Glue, thus prepared, is more or less perfect, in proportion to the care with which it is clarified: it should be complctly soluble in water.

Another very powerful glue may be prepared by a spirituous solution of isinglass, which Mr. BOYLE directs to be first steeped for twenty-four hours in common brandy; when the isinglass is opened and softened, the whole should be gently boiled together, and stirred till it forms a perfect solution, and till a drop of the cold liquor indicates a strong jelly. It is then to be strained while hot, through a clean linen cloth, into a vessel; which ought to be closely stopped. A gentle heat will be sufficient to dissolve this glue into a colourless, and nearly transparent fluid, which is said to be so adhesive, that pieces of wood glued with it, separate elsewhere sooner than in the place where they are joined....See ISINGLASS.

[The following account of the mode of making glue, is extracted from a late British publication.

"Pelts obtained from furriers and hatters, the hoofs and ears of horses oxen, calves, sheep, &c. all yield glue. These are first digested in lime water, to cleanse them as far as it can, from the grease or dirt they may have contracted: they are then steeped in clean water, taking care to stir them well from time to time; afterwards they are laid in a heap, and the superabundant water pressed out; then they are boiled in a large brass cauldron with clean water, skimming off the dirt as it rises, and further cleansed by putting in, after the whole is dissolved, a little melted alum, or lime finely powdered, which, by their detersive properties, still further purge it: the skimming is continued for some time, when the mass is strained through baskets, and suffered to settle, that the remaining impurities, if any, may subside; it is then poured gently into the kettle again, until it becomes a clear darkish brown colour; when it is thought to be strong enough, (which is known either by the length of time a certain quantity of water and mate-

rials have boiled, or by its appearance during ebullition.) it is poured into frames or moulds of about six feet long, one foot broad, and two deep, when it hardens gradually as the heat decreases: out of these troughs or receivers it is cut when cold by a spade into square pieces or cakes, and each of these is placed within a sort of wooden box, open in three divisions to the back; in this the glue, as yet soft, is taken to a table by women, where they divide it into three pieces, with an instrument not unlike a bow, having a brass wire for its string; with this, they stand behind the box and cut by its openings, from front to back: the pieçes thus cut are taken out into the open air, and dried on a coarse net work, fastened in moveable sheds of about four feet square, which are placed in rows in the glue maker's field, (every one of which contains four or five rows of network;) when perfectly dry and hard, it is fit for sale."

Character of good glue. That is thought the best glue which swells considerably without melting, by three or four days' immersion in cold water, and recovers its former dimensions and properties by drying. Glue that has been frosted, or that looks thick and black, may be melted over again and refined, with a sufficient quantity added of fresh to overcome any injury it may have sustained; but it is generally put into the kettle after what is in it has been purged in the second boiling. To know good from bad glue, it is necessary for the purchaser to hold it between his eye and the light, and if it appears of a strong dark brown colour, and free from cloudy or black spots, the article is good.

M. Hatchett observes, "that glue made from the skins of animals is more tenacious and of a better quality, than that which is made from feet and sinews. The more aged the animal the better the glue, but a longer continued boiling appears requisite in order to extract it, and the more viscid glues are obtained from the substances which afford them, with greater difficulty than those of a less viscid quality, which may more properly be called size." *Trans. of the Royal Soc.* Lon. 1800, part 2.

An excellent glue may be procured from cheese. Take skim-milk cheese, free it from the rind, cut it in slices, and boil it in warm water, stirring it with a spoon, until it be reduced to a strong glue which does not incorporate with water. Then throw away the warm water, pour cold water over the glue, and knead it afterwards in warm water, subjecting it to the same process several times. Put the warm glue on a grinding stone, and knead it with quick lime until you have a good glue. When you wish to use this glue, you must warm it: if it be employed cold it is not so strong, though it may also be used in that manner. This glue is insoluble in water as soon as it is dry, and it becomes so in forty-eight hours. It may be used for glueing wood and for cementing marble, &c. The joining can scarcely be discovered.

Baits also for catching fish may be made of it. Fish are very fond of it, and it resists the water..... Boerhaave observed, that no menstruum dissolved cheese, not even aqua regia. *Transactions of the Academy of Sciences at Stockholm.*

Glue of the Laplanders. The

bows of the Laplanders, are composed of two pieces of wood glued together; one of them of birch, which is flexible, and the other of fir of the marshes, which is stiff, in order that the bow when bent may not break, and that when unbent it may not bend. When these two pieces of wood are bent, all the points of contact, endeavour to disunite themselves, and to prevent this, the Laplanders employ the following cement: they take the skins of the largest perches, and, having dried them, moisten them in cold water until they are so soft that they may be freed from the scales, which they throw away. They then put four or five of these skins in a rein deer's bladder, or they wrap them up in the soft bark of the birch-tree, in such a manner that water cannot touch them, and place them thus covered into a pot of boiling water, with a stone above them to keep them at the bottom. When they have boiled about an hour they take them from the bladder or bark, and they are then found to be soft and viscous. In this state they employ them for glueing together the two pieces of their bows, which they strongly compress and tie up until the glue is well dried. These pieces never afterwards separate. *Transactions of the Academy of Sciences at Stockholm.*]

GNAT, or *Culex*, L. a genus of insects comprising several species, which are well known by the severe punctures they inflict.

Gnats deposit their eggs to the number of 200, by each female, on stagnant waters where they are hatched into small grubs, in the course of two or three days. On the sides are four small fins, by the aid of which the insect swims about, and swiftly dives to the bottom. The larvæ retain their form a fortnight, or three weeks; when they are converted into chrysalis, in which state they continue three or four days, floating on the surface of the water, till they assume the form of gnats.

These insects have a cylindrical body, consisting of eight rings. The sting, which is perceptible to the naked eye, contains five or six spiculæ, or darts, exquisitely minute. With these, gnats make punctures in the skin, and are supposed to inject a small portion of liquor which renders the blood circulating near the wound more fluid, and thus causes troublesome itching. Others observe, that female gnats only extract the blood by suction. As, however, these stings are generally attended with a painful swelling, different remedies have been suggested for its removal: one of the most effectual consist of small, but equal portions of Venice turpentine and sweet oil; they should be mixed and applied to the wounded part, which will be effectualiy relieved in the space of six hours. Indeed, olive oil alone, or unsalted butter, or fresh hog's-lard, if timely rubbed on the sting, will be equally efficacious. But we cannot approve of any *mercurial* solutions, that have occasionally been advised in popular books, for the more speedy cure of this trifling affection.

GOAT, or *Capra*, L. a genus of animals, comprising more than 30 species, only one of which is reared in this country, namely, the *Hircus*, or Common Goat, a native of Mount Caucasus, in Asia, whence it has been dispersed through Europe.

This species has arched and

keeled horns, with a long beard, and is peculiarly attached to the company of man, even in its wild state. The females generally bring forth one or two, and very seldom three kids, after a gestation of about five months; they attain an age of twelve years.

Goats are sensible of caresses, and display a remarkable attachment to their friends. They are stronger, more nimble, and less timid than sheep; possess a lively, capricious and wandering disposition; and delight in elevated and solitary places, frequently sleeping on the points of rocks and precipices. These animals are more easily supported than any others of the same size; for there are few herbs which they will not relish. Nor are they liable to so many disorders as sheep; and, though able to support the vicissitudes of heat and cold more easily than the latter, yet they are very susceptible of severe frosts, which they endure with less difficulty in the society of other animals.

Goats emit, at all times, a strong and disagreeable odour, which however is not without its use: for, if one of these animals be kept in a stable, it is affirmed that it will be an effectual preventive of the *staggers*, a disorder which is often very fatal to horses. This influence of the goat is not, as Mr. MARSHALL judiciously observes, in his "*Rural Economy of Gloucestershire*," merely that of a charm; for the staggers are evidently a nervous disorder. Odours, in many cases, operate beneficially on the human nerves, and probably the strong scent of the goat has a similar effect on those of the horse; a conjecture which is partly corroborated by the practice adopted in Northumberland, where a few goats are generally mixed with the sheep, for the preservation of the health of the flock. It is also well known, that the former with safety eat plants, which would be destructive to sheep and other animals. Hence, goats devour the leaves of hemlock with impunity; but the Spotted Snakeweed, *Polygonum Persicaria*, as well as the leaves and fruit of the Common Spindle-tree, *Evonymus Europæus*; L. are to them not less fatal than to other quadrupeds.

Although the food of goats is attended with little expence, as they maintain themselves on the most barren mountains, yet their produce is of considerable value. The whitest wigs are made of their hair, for which purpose that of the Welsh he-goat is in the greatest request. Their fat is in equal esteem with the hair, and candles are made of it, which, in whiteness and quality are said to be superior to those of wax; their horns afford excellent handles for knives and forks; and their skin is well calculated for gloves, especially that of the kid, which is dressed abroad, made into stockings, bed-ticks, bed-hangings, sheets, and even shirts.

The flesh of these animals, however, is hard, and almost indigestible: hence the meat of kids only should be eaten, as it is more tender, and affords good nourishment. Goat's-milk is sweet, nutritive, and medicinal; it is an excellent substitute for that of asses; and, when drank warm in the morning and evening, with a tea-spoonful of hartshorn, for several weeks, it has been productive of benefit to phthisical patients, who were not too much reduced. Cheese prepared

from goat's-milk is much valued in mountainous countries, after it has been kept to a proper age; but, possessing a peculiar flavour, it is to some persons very unpleasant; nor is it more easily digested than any other kind of caseous matter.

GOAT'S-BEARD, or *Tragopogon*, L. a genus of plants comprising 16 species, two of which are indigenous.

1. The *pratense*, Yellow Goat's beard, or Go-to-bed-at-noon (because its blossoms close about the middle of the day) grows in meadows and pastures, where it flowers in June. Dr. WITHERING remarks, that the young roots of this plant, in spring, may be boiled and eaten like asparagus, as they possess a similar flavour, and are nearly as nutritious.

2. The *porrifolium*, or Purple Goat's-beard, is also found in meadows, and not unfrequently in upland pastures; it flowers in the month of May. The succulent roots of this vegetable, when cultivated in gardens, are called *Salsafy*. Cows, sheep, and horses, eat the whole of this plant; swine devour it with avidity, but it is not relished by goats. The tender roots afford a delicious salad, and also an excellent substitute for asparagus.

GOLD, the most valuable of all metals, is of a bright yellow colour in its pure state, but acquires different shades, when alloyed with baser metals.

Europe is supplied with gold chiefly from Chili and Peru, in South America; though a small quantity is likewise imported from China, and the coast of Africa..... This metal is also found in the sands of several large rivers which do not spring from mountains, but contain veins of gold: mines of it exist in various parts of Europe, and a very promising one has lately been discovered in the county of Wicklow, in Ireland.

Gold is obtained in a pure or native state more frequently than any other metal; it is in general mixed with a stony matter, from which it is extracted by amalgamation.... It is more ductile than lead, or tin, but less elastic than either iron or copper. Gold becomes hard and brittle, by continued hammering, but resumes its ductility when slowly heated. Being the toughest, and at the same time the most malleable of all metals, one grain of it may be hammered into leaves that would cover a space of 1400 square inches.

This precious metal is the heaviest of all known bodies, excepting *platina*; its specific gravity being to that of distilled water as 19,2581 to 1,0000; that is, one solid inch of gold weighs about nineteen or twenty times heavier than one cubic inch of water. It melts in a low white heat, requiring, according to Mr. WEDGEWOOD's calculation, 5237 degrees of FAHRENHEIT's, or thirty-two of his own thermometer; a point much higher than that required for the melting of silver or copper.

Gold is not only the universal circulating medium for the purchase of commodities, but it is also applied to various purposes; for instance, chains, watches, plate, the making of gold lace for liveries, &c. As the manufacture last mentioned frequently becomes tarnished, and totally loses its lustre, we shall briefly observe, that this may

be easily restored, by gently rubbing the lace with a sponge dipped in warm spirit of wine.

Gold is soluble in aqua regia, by which considerable quantities of it are consumed by carvers and gilders, and also for the ornamenting of china, &c. It may, likewise, though imperfectly, be dissolved in the most concentrated aqua-fortis.

The relative value of gold to that of silver, was anciently as *twelve* to *one*. This proportion, however, varies according to the abundance or scarcity of the former metal..... In our coinage, the value of fine gold is to that of fine silver, as $15\frac{1}{2}$ to 1. A similar proportion may be considered, upon an average, as the fixed standard of Europe.

[Mr. Hatchet has lately presented to the *Royal Society of London*, an interesting paper on the alloying of metals; from which it appears that copper, in proportion of 1-12th, is the best alloy for gold. From many experiments it is ascertained, that the deficiency found of late in gold coin, is not owing to the wear of circulation; as in a quantity of guineas loosely packed and sent to some distance by the coach, the wear was all upon a few, and on those the impression was quite obliterated; yet they were not found much deficient in weight, the work being by action, pressed in, and not, as it were, filed off.]

There are various methods of determining the fineness of gold or the proportion of alloy which it contains. For this purpose, *touch-needles* are generally employed, by which the respective quality of gold can be ascertained with tolerable exactnes. These needles are small bars made of compound metals, in different proportions, which are accurately marked on each; and, by rubbing the metal under examination, and one or more of the needles, close to each other on a *touch-stone*, the different strokes are compared, in order to judge by the colour which bears the strongest resemblance to that of the doubtful metal. The most usual stones for this test are black basaltes, though either flint, or potter's ware of a black colour, may be employed with equal advantage. And though such a criterion cannot be relied upon with the same degree of accuracy as that of ascertaining the specific gravity of different metals, yet the touch-needles give a more exact information than might be expected from this superficial assay. Thus, an expert goldsmith will not altogether decide from the difference of colour, but will also be guided by the concomitant effect produced on the texture of the metal, when abraded by the touch-stone, namely, whether it be rough, dry, smooth, or greasy. See Guinea.

Several metallic compositions, however, yield marks or impressions on the touch-stone, very nearly resembling those of pure gold, and which can be distinguished or detected only by another more accurate test. In order to guard against such impositions, it is necessary to apply a drop of aqua-fortis to the suspected metallic strokes on the stone: if they do not disappear, in consequence of this application, it may be safely concluded that the gold is genuine; as, in the contrary case, it will be evident that it is a base or adulterated metal.

Gold-cup. See Bulbous Crow-foot.

GOLDEN-ROD, the Common

or WOUND-WORT, *Solidago Virgaurea*, L. an indigenous perennial plant, growing in woods, hedges, heaths, and copses; and flowering from July to September.

This plant was formerly officinal, and is still in great repute among country people, for its medicinal virtues; but we are inclined to think it may with greater advantage be employed as a dyeing drug. Both its leaves and flowers impart a beautiful yellow colour; which, according to BECHSTEIN, is even superior to that obtained from woad.

GOLD-FINCH, or *Fringilla Carduelis*, L. is a native of Europe, and is sometimes also found in Asia and Africa.

This bird is peculiarly beautiful in its colour, of an elegant form, and strikes melodious notes. Its bill is white, tipped with black, and its forehead and chin of a rich scarlet tint, divided by a line passing from each corner of the bill to the eyes, which are black.

Gold-finches begin to sing early in the spring, and continue to whistle the greater part of the year, when kept in a cage. In a state of confinement, they are much attached to their keepers, and will learn a variety of little tricks, such as to draw up small vessels containing hemp or Canary-seeds, and water; to fire squibs or crackers, &c.

Gold-finches construct very neat and compact nests with moss, dried grass, and roots, which they line with wool, hair, the down of thistles, and other soft substances.... The females lay five white eggs, marked with deep purple spots at the larger end: they feed their young with caterpillars and insects; but the old birds subsist on various kinds of seeds, especially those of the thistle, of which they are extremely fond.

As these birds are frequently liable to be sick, it will be requisite to allow them every day a little groundsel, and some saffron in their water. If they are lax, a small portion of chalk should be given them, either by fixing it to the side of the cage, or crumbling it on the bottom.

Red sand, or gravel, should likewise be strewed every day in their habitation; for, as they chiefly subsist on oily seeds, the gravel or sand will qualify, and absorb the oil in their stomachs. Gold-finches will breed with the Canary-bird: this intermixture is most successful between the male finch and the female Canary, whole offspring is productive, and is said to resemble the male in the bill, the colours of the head, and wings; and the hen, in the rest of the body.

[GOLD-FINCH (*Fringilla tristis.*) called yellow-bird, or Dutch yellow bird, to distinguish it from a beautiful little summer bird of passage (*motacilla æstiva*) or the common yellow-bird.

It is about the size of the *F. Carduelis*, above mentioned, of a beautiful light yellow colour, except that it has a crow black spot on the forehead, larger feathers in the wings and tails, which are also of the same crow colour. It is a beautiful, vivacious little bird; its notes are variable and lively, some of them seem to resemble the Canary-bird, with which they will breed, producing mules of various colours. W. BARTRAM.]

GOLD-FISH, or *Cyprinus auratus*, L. is a native of the East-

Indies, whence it was introduced into England, about the latter end of the 17th century.

These fish are very tender, even in their native climates; but they are now become so naturalized, that they even breed in this country. They are chiefly kept in glass vessels for ornament; but it has lately been ascertained, that they thrive and propagate in ponds or other reservoirs; where they grow much larger and come to greater perfection than in the East: hence it is proposed to rear them in preference to *carp*, on account of their possessing a finer flavour, and being much better calculated for the table than the common carp.

GOLD OF PLEASURE, or COMMON CAMLINE, *Alyssum sativum*, v. *Moenchia sativa*, L. an indigenous plant, growing in corn-fields, frequently among flax (with the seeds of which it is supposed to have been imported from foreign countries); it flowers in June.

This plant is cultivated in Germany, on account of its *seeds*, from which an excellent *oil* is expressed: one bushel of the former yielding from 24 to 28 lbs. of the latter, which is equally useful for culinary and other economical purposes.

According to German writers, the seeds of the Common Camline afford a larger proportion of lamp-oil, and which is of a finer quality than that obtained from rape-seed; though it is more liable to become rancid. Nevertheless the culture of the former strongly recommends itself to the farmer; as it will grow in unfavourable weather, when flax cannot prosper. The Gold of Pleasure, however, requires a well prepared soil, should be thinly sown, and not harrowed in too deep: if properly cultivated, it yields more than one hundred-fold.

The seeds of Camline are likewise a favourite food with geese and other poultry. Horses, cows, goats, and sheep, relish the plant.

GOOSE, or *Anas anser*, L. a well known species of birds, very common in this country: it is divided into two varieties:

1. The *ferus*, Grey Lag, or Wild Goose, that inhabits the fens, where each female hatches eight or nine young, which are frequently caught, easily tamed, and afford excellent meat, far superior to that of the domesticated kind. Towards winter, they collect in flocks, but reside the whole year in the marshes.

2. The *mansuetus*, or Tame Goose, or the Grey Lag in a state of domestication, from which it varies in colour, being more or less inclined to a grey. It is, however, often found perfectly white, especially the males or ganders.

[Mr. WM. BARTRAM informs the Editor that "there is a valuable breed of this Fowl in the Southern states, from a mixture of the largest Grey Goose, with the wild Canadian Goose, (*Anas Canadensis.*) They are much larger than any sort of tame geese; and in their cry and manners resemble the Canadian Goose."]

The goose, in general, breeds only once in the course of a year; but, if well kept, it will frequently hatch twice within that period.... Three of these birds are usually allotted to a gander; for, if that number were increased, the eggs would be rendered abortive: the quantity of eggs to each goose for sitting, is about twelve or thirteen.

While brooding, they ought to be fed with corn and water, which must be placed near them, so that they may eat at pleasure. The males should never be excluded from their company, because they are then instinctively anxious to watch over, and guard their own geese.

The nests, in which these birds sit, ought to be made of straw, and so confined that the eggs cannot roll out, as the geese turn them every day. When they are nearly hatched, it will be requisite to break slightly the shell near the beak of the young goslin, as well for the purpose of admitting air, as to enable it to make its way at the proper time.

Geese are very valuable, on account of the feathers they afford: for the purpose, they are unmercifully plucked in the county of Lincoln (where they are reared in the largest numbers) *five times* in the year: the first operation is performed at Lady-day, for feathers and quills, and is repeated four times between that period and Michaelmas, for feathers only. The old birds submit quietly, but the young ones frequently prove unruly and noisy. The latter may be plucked once, when about thirteen or fourteen weeks old, for feathers; but no quills must be taken from them; nor should this operation be performed at too early a season, because the goslings are liable to perish in cold summers. Although the plucking of geese has by many been considered as a barbarous custom, yet experience has evinced, that these birds, when properly stripped of their feathers, thrive better, and are more healthy, than if they were permitted to drop them by moulting.

As geese form a principal delicacy at our tables, the most expeditious mode of fattening them is an object of some importance..... Hence it has been recommended to keep them cooped up in a dark and narrow place, where they are to be fed with ground malt mixed with milk, or if milk be scarce, with barley-malt, mashed up with water. Another, and less expensive way, of which we can speak from experience, consists in giving them boiled oats, with either ducks'-meat, or chopped carrots, alternately, as they are exceedingly fond of variety: thus, they will become very fat in a few weeks, while their meat acquires a fine flavour.

In order to fatten *Michaelmas*, or *stubble-geese*, it has been directed, first to turn them on the *wheat-eddishes*, or those pastures that grow after the wheat has been harvested. Next, they are to be pent up, and fed with ground malt mixed with water, for which, boiled oats, malt or wheat, may occasionally be substituted.

This method of fattening, however, by no means deserves to be countenanced; for, as the flesh of geese is naturally a precarious food, confinement, without exercise, renders it still more unwholesome. Their fat, indeed, is almost indigestible; and their flesh has a very bad effect on wounds and ulcers. It is also pernicious to persons, whose habits of body predispose them to inflammatory diseases, and frequent eruptions of the skin; for the prevention of which, they ought prudently to abstain from this delicious morsel.

GOOSEBERRY, the ROUGH, or FEA-BERRY, *Ribes grossularia*, L. an indigenous shrub growing in

woods and hedges, especially about Darlington, Durham; also, on old buildings and church-towers, whither it has probably been transplanted by birds. This useful bush flowers in April, and bears fruit in June or July, which, however, does not acquire its natural vinous flavour in this climate, till August or September.

Although gooseberries are generally eaten, or employed for culinary purposes, before they arrive at perfect maturity, yet being one of the most saccharine productions we possess, they might with more advantage be converted into *wine*. As each pound of the juice expressed from ripe berries requires only one ounce of soft sugar, (whereas the ripest currants require double that quantity) to induce the vinous fermentation, a very excellent and wholesome domestic wine may be made at a trifling expense. After standing several years in bottles well corked, it becomes equal in quality to muscadel, or other sweet Italian wines. If the flower-buds of this shrub be added to a cask of any other flavourless wine, Bryant asserts (in his 1st volume of "*Nutritive plants*," p. 243, German edition) that they impart to it the taste of genuine muscadine.

The husks of this fruit, when the juice is expressed for making wine, are usually thrown away: it appears, however, that they may with advantage be employed in distillation, and afford an agreeable spirit, resembling Brandy. It has indeed been ascertained by experience, that such liquor, after having been kept a few months, was little inferior, in point of strength and flavour, to the best French Coniac.

[Gooseberries do not succeed well near Philadelphia, owing probably to the great heat of our summers: for it is understood, that in Canada and Nova-Scotia, this fruit grows to a large size. It was lately mentioned to the Editor, that a successful cultivator of gooseberries at Newcastle, upon Tyne, was in the practice of covering the bushes with mats, to prevent the influence of the sun causing a rapid maturity. Probably a shady situation in the United States would answer equally well.

Dr. Darwin gives the following additional reason for covering fruit and plants......" When vegetable fibres have been long stimulated more than natural or usual by increase of heat, the spirit of vegetation becomes exhausted; and in consequence a slighter degree of cold will destroy them; because their fibres, after having been long excited by a greater stimulus, will cease to act on the application of one which is much less; whence after hot days, tender plants are more liable to be destroyed by the coldness of the nights. For this reason also, in more *northern climates, the gardeners shade their tender vegetables*, as *the flowers of apricots*, in the spring frosts, from the meredian sun, as well as from the *coldness of the night*, which is generally the greatest about an hour before sunrise."...*Phytologia*, Sect. xiv. 1. 1.

" At the late annual gooseberry shew at Chester, England, the following were adjudged to be the principal prizes, viz. of red....Mr. Bell's *Alcocks King*, weighed 18 dwts. 19 grains.....of yellow, Mr. Warburton's *Royal Sovereign*, 14 dwts. 10 grains....of green, Mr. Warburton's *Langly Green*, 14 dwts. 5 grains; and of white, Mr. Warburton's *Whitesmith*, 16

dwts. one grain."....*Monthly Mag.* London, Sept. 1801.

In HOLT's *View of the Agriculture of Lancashire*, we also find the following facts :...." A single gooseberry tree, the Manchester rough red, in the garden of J. SYKES, yielded *twenty-one* quarts of fruit in their green state ; the whole quantity weighed *twenty-eight pounds !* avoirdupois." FORSYTH gives a list of the most celebrated gooseberries, with their respective weights, which shews to what perfection this fruit is brought in England.

Gooseberries are a delicious and wholesome fruit, and would be found very profitable, if attended to, in the United States. They not only afford a very pleasant article of diet but also form the chief article in an excellent domestic wine. Such a wine, made near Downing's-town, the Editor had the satisfaction lately to taste, and hopes to be able to describe the particular process pursued in making it, under the article WINE.

This fruit may be preserved by being put up dry in a large mouthed, strong black bottle, covering the cork well with rosin.

The following directions for cultivating gooseberries are taken from FORSYTH.

Gooseberries are raised from cuttings, or from seed, and some raise them from suckers ; but this last is not a good way, as bushes raised in this manner are more liable to throw out suckers than those which are raised from cuttings or seed.

The best time for planting cuttings is about Michaelmas, always cutting them from the strongest and cleanest shoots. The length of the cuttings should be from six to eight inches, planting them to an East or North aspect, at the distance of one foot from row to row, leaving them about three inches above ground. By planting at this distance, you will be able to hoe and keep them clear of weeds. Water them frequently in dry weather during the spring.

The Methods of Planting Gooseberries.

The Market-Gardeners about London plant them in rows from eight to ten feet apart from row to row, and six feet from plant to plant in the rows. In that case, I advise pruning them in the beginning of October, and the ground between may be planted with Coleworts or Beans from a spring crop; by so doing, there will be no occasion to tread over the ground and hurt the coleworts in pruning the bushes ; for, before the gooseberries begin to shoot, the coleworts will be all cleared off the ground.

After this time (or before if you find it convenient) lay a good coat of rotten dung on the ground ; then dig it and plant early potatoes ; but not so near to the gooseberries as to hurt them.

The roots of gooseberries should always be kept clear to admit the sun and air. In small gardens I would recommend planting them in a quarter by themselves, at the distance of six feet between the rows, and four feet from plant to plant ; or you may plant them round the edges of the quarters, about three feet from the path ; you will then have the ground clear for cropping, and a man, by setting one foot on the border, can gather the gooseberries without injuring the crop.

As gooseberries love a rich soil, they should be dunged every year,

or at least have a good coat of dung once in two years.

Never plant them under the shade of other trees, as it will injure the flower of the fruit

Of Pruning Gooseberry Bushes.

It is a practice too common in pruning gooseberries, to let them branch out with great naked stems, suffering them to remain in that state for years. When that is already the case, they should be cut down near to the ground in the winter pruning; this will make them throw out fine strong healthy shoots which will bear fruit the second year. Gooseberry-bushes, in general, bear their fruit on the second year's wood. Care should be taken in summer to keep the middle of the bush clear to admit a free air into them; leaving the finest and strongest shoots from six to ten inches distant from each other. This will help to ripen and harden the wood: It is a practice with some to shorten the shoots in the autumn or winter pruning: This should be always near to a wood-bud; which may be known by its being single, whereas fruit-buds are in clusters. The shoots may be shortened to eight or ten inches, according to the strength. Some leave them at full length for three or four years, thinning out those that are superfluous. Always leave a proper number to be trained up between the full length shoots, to succeed them when they are tired of bearing; then cut the old ones down to the young ones that are to succeed them. By these means you will always keep the bushes in a constant state of bearing.

You may observe, that those branches which were cut the first year, will in the second throw out short dugs, or spurs, which produce the fruit; and these should by no means be cut off, unless the branches are in a sickly state, and require to be cut close down (as is the case this year, 1800), when the bushes are overloaded with fruit. It will then be necessary to cut out a good deal of the old wood, to assist nature to recover herself after producing so great a quantity of fruit.

It is a practice with some to clip the tops of gooseberries with a pair of garden shears, as they would clip a thorn hedge; this I by no means approve of, as the fruit will not be half the size, nor of so fine a flavour, as when the bushes are kept clear of superfluous wood.

Care should be taken in spring and summer to stock, or grub up, all the suckers from the roots of the bushes, leaving their stems clear and unencumbered.

Many of the Lancashire sorts are apt to grow horizontally, and the branches frequently trail on the ground, which renders them liable to be broken by high winds, especially when they are loaded with fruit. In that case I would recommend two or three hoops to be put round them, to which the branches may be tied, to support them, and prevent their being broken by the wind.

Those who wish to have their gooseberries very late should plant on North walls and pailings, between the other trees, and they may be removed when the trees begin to meet. If laid in thin, they will be very fine and handsome fruit. I would advise to plant the finest late sorts; as by this method the table will be sup-

plied much longer than by the common custom of planting in quarters.

Immediately after pruning, I always apply the composition to the ends of the shoots and cuttings; and I find it of great use in preventing the exhalation of the sap, and preserving the cuttings till they take root.

Gooseberries are very much infested with a small green caterpillar, which frequently devours both leaves and fruit.

You must, therefore, be very attentive, and observe their first appearance on the bushes, for, if not destroyed early, they will increase so fast, that they will soon devour all the leaves, and the fruit will then be good for nothing.... They make their first appearance generally on the edges and undersides of the leaves.

Take some sifted quick-lime and lay it under the bushes; but do not at first let any of it touch the branches or leaves; then shake each bush suddenly, and smartly, and the caterpillars will fall into the lime; if the bush be not shaken suddenly, the caterpillars, on being a little disturbed, will take so firm a hold as not easily to be shaken off. After this is done, sift some of the lime over the bushes, this will drive down those which may have lodged on the branches. The caterpillars ought to be swept up next day, and the bushes well washed with clear lime-water mixed with urine; this will destroy any caterpillars that may still remain, and also the Aphides, if there are any on the bushes.

To the above, the Editor will only add, in case the gooseberry bush does not succeed on first planting, *change its position*: by doing so *three times*, a friend at last succeeded in raising a very fine bush, which amply rewarded his trouble and patience.

Dr. Anderson, who has investigated the natural history of the gooseberry caterpillar with great minuteness, observes, that these insects always commit their depredations on the under sides of the leaves, at the bottom of the bush: and begin by gnawing off the edges. While young, they herd together, but as they advance in size they separate. He therefore directs the tree to be searched repeatedly, to pinch off all leaves on which the caterpillars are found, and to kill them instantly. By this method he saved his bushes, though the caterpillars seized upon them in such numbers, that had they been neglected only for a few days, every leaf must have been destroyed.

The following mode of destroying gooseberry caterpillars is given in the London Monthly Magazine, for March, 1800.

"Make a cone by covering three or four hoops with a tarpaulin, or coarse brown paper. When the trees are affected by the caterpillar, strew hot lime under and around the trees, and cover the bush with the cone; fill a common fumigating bellows with tobacco and sulphur, in equal quantities with a bit of charcoal, or any other piece of fire-wood; thrust the pipe of the bellows through a small hole of the painted cloth at the bottom of the cone, when a few moments are sufficient to suffocate all the caterpillars; falling on the lime, they serve as a manure to the tree. No injury is done to the tree."]

Wild gooseberries, however, are

of a very inferior size to those cultivated in a rich garden soil, especially when improved by inoculation, or engrafting; in which state they frequently attain an uncommon size.

There is another species of this shrub growing wild about woods and hedges, in several places in Cambridgeshire, Oxfordshire, Norfolk, and the Isle of Wight. We allude to the SMOOTH GOOSEBERRY, or *Ribes uva-crispa*, L. which can with difficulty be distinguished from the preceding species, either by the flower scales, or even by the smoothness of its berries. Mr. ROBSON assured Dr. WITHERING, that the seeds from the same plant will produce both rough and smooth gooseberries. The last mentioned species, however, flowers somewhat later, thrives in almost every soil, and does not attain the size of the rough gooseberry: its yellow berries are transparent, juicy, and contain a great number of seeds.

Beside these, we meet with another Linnæan species, or perhaps a variety of the former, called the RED GOOSEBERRY, or *Ribes reclinatum*, which grows wild in Germany, &c. has somewhat broader leaves than those before described, and produces a red or dark purple fruit of a very sweet flavour. It thrives remarkably in a fat, light, and sandy clay: we therefore conclude that its berry would be eminently adapted to the preparation of domestic wines.

All the different gooseberries are wholesome fruit, but should not be eaten before they are perfectly ripe; nor is it proper to swallow their stones along with the juice; but the skin may, with probable advantage, be used by those who are accustomed to take large quantities at one time; in order to prevent flatulency. It is, however, founded on erroneous notions of their chemical properties, either to boil the *unripe* berries for sauces, or to convert them into domestic wines, which though more cooling and refreshing, do not possess the delicate flavour, and rich saccharine quality, inherent only in ripe fruit.

GOOSEBERRY CATERPILLAR.... See CATERPILLAR.

GOOSE-FOOT, or *Chenopodium*, L. a genus of plants, comprising twenty-seven species, eleven of which are indigenous; of these the following are the principal:

1. The *Bonus Henricus*, Perennial Goose-foot, Mercury Goosefoot, or Good King Henry, which grows amongst rubbish, on road sides, and walls; and is sometimes found in pastures: it produces purplish-green flowers, that are in bloom from May to August. This plant is cultivated like spinach by the poorer class of people in Lincolnshire: its leaves are frequently boiled in broth; and the young shoots, when peeled and dressed, are, on account of their flavour, eaten as substitutes for asparagus. Neither goats nor sheep relish this plant, which is also refused by cows, horses, and hogs. Its roots, however, are frequently given to sheep affected with a cough, and are supposed to afford an excellent medicine for preventing consumption in those animals.

2. The *album*, White Goosefoot, or Common Wild Orache; which grows frequently in cornfields, on old dunghills, rubbish, and in gardens; and flowers in the months of July and August. It is eaten by cows, goats, sheep, horses,

and hogs, which last devour it with avidity; but LINNAEUS asserts that it is totally refused by horses.... According to Prof. PALLAS, the white goose-foot is a very troublesome weed among corn, on the banks of the Volga, where the German colonists make use of its very abundant seed, by mixing it with bread corn, and also boiling it separately in the form of *groats* .....TOWNSEND relates, that a species of pot-ash, or barilla, is prepared from this plant.

3. The *olidum*, *v. vulvaria*, Stinking Goose-foot, or Fetid Orache, an annual plant, growing on road sides, old walls, and rubbish, and flowering in August.... This species, in a fresh state, has a nauseous taste, and a strong offensive smell, similar to that of putrid salt fish. It is nevertheless eaten by cows, horses, goats, and sheep, but refused by swine...Though exploded by the London College, Dr. CULLEN strongly recommends the fetid orache as a powerful antispasmodic, especially in hysterical cases.....DAMBOURNEY dyed wool of a durable citron colour with a decoction of the whole plant; but the stuff was previously immersed in a diluted solution of tin; and though the liquor emitted the unpleasant fetor of this vegetable, yet the wool acquired no smell.

4. The *maritimum*, Sea Goose-foot, Small Glass-wort, or Sea-blite, which abounds on the seashore, and flowers in the months of July and August....Dr. WITHERING mentions it as an excellent pot-herb....In Siberia, and in Astrakhan, the inhabitants obtain from this plant their *pot-ash*, which probably partakes more of the nature of *soda*.

5. The *polyspermum*, Upright Blite, Round leaved Goose-foot, or All-seed Goose-foot, which grows on cultivated ground and dunghills, and flowers in the month of July or August. This curious plant has not hitherto been converted to any useful purpose; though we believe its numerous seeds might be advantageously employed in feeding poultry. Perhaps it is a variety of the *quinoa*, which grows in the mountains of Peru, where each plant affords upwards of 4000 grains, equal, if not superior, to rice; for we find in the French "*Annee Litteraire*" for 1781, that this exotic vegetable is a species of the Goose-foot. [See CHENOPODIUM.]

GOOSE-GRASS, or CLEAVERS CLIVERS or CATCHWEED GOOSE-GRASS; *Galium aparine*, L. an indigenous plant growing in cultivated grounds and hedges, and flowering from June to September.

This succulent vegetable possesses no smell, and is of a somewhat bitter and acrid taste. An ointment prepared of the herb, when bruised and mixed with lard, is said to be an useful application for discussing strumous swellings.

Dr. MAYERNE informs us, that three ounces of the juice of this plant, taken twice a day in wine, have been found singularly beneficial as an aperient and diuretic in incipient dropsies. Its greatest efficacy, however, is said to be evident in scorbutic complaints, for the cure of which a tea-cupful of its expressed juice is to be taken every morning, for nine or ten days. When the fresh plant cannot be procured, the dried leaves may be infused and drank like tea.

The branches of this vegetable are employed by the Swedes, as substitutes for a hair sieve to strain

milk. Young geese are exceedingly fond of the leaves; and the whole plant is eaten by horses, cows, sheep, and goats. It is remarkable, that the bones of poultry feeding on the roots of goose-grass, acquire a red colour.

[The Rev. Dr. BATEMAN has published an account of the great benefit derived from the use of the juice of this plant in cancers, foul ulcers and scorbutic eruptions. The dose is a gill twice a day. The effects are said to be slow, though certain. An ointment must be prepared from the leaves with hogs' lard, and applied to the ulcers, the fresh plant being too heating to apply to them. The parts must of course be kept clean, salt meat avoided, and temperance strictly observed. *Gent. Mag.* 2d *part* 1790.]

There is another species of this plant, namely, the CROSS-LEAVED, GOOSE-GRASS, BED-STRAW, or CROSS-WORT MADDER, *Galium boreale*, L. which grows on mountains, rocks, and in gravelly places in Westmoreland and Wales; its stalk attains a height of from one to four feet, and its beautiful white flowers appear in July and August.

In Sweden the root of this vegetable is known by the name of *mattare*, and is generally employed for dyeing wool of a fine crimson colour. According to BECHSTEIN, this herb affords a very grateful and wholesome food to cattle.

GOURD, or *Cucurbita*, L. a genus of plants comprising nine species, of which the following are the principal:

1. The *lagenaria*, or Bottle Gourd, a native of both Indies, where it grows on the banks of rivers: it has thick, trailing, downy stalks, extending from 10 to 20 feet, and producing large white flowers, which are succeeded by long incurvated fruit of a whitish yellow colour, from 2 to five or 6 feet in length, and from 9 to 24 inches in circumference.

2. The *Pepo*, Pompion, or Common Gourd, which is cultivated in various parts of Germany, but the native soil of which is unknown... It produces fruit of various shapes and sizes, frequently 18 inches in diameter, and its culture in a tolerable land exposed to the rays of the sun, requires but little trouble. The pulp of the fruit is eaten as an ingredient in puddings and pancakes. But the most economical use of this bulky vegetable production, is that of fattening pigs, as well as carp when thrown into fish-ponds. For these purposes, extensive fields are devoted to the growth of the Common Gourd in Bohemia, Saxony, Thuringia, &c. climates which coincide with many parts of Britain, so that this plant certainly deserves to be more generally reared in this country.... Besides, its numerous seeds afford an unusual proportion of expressed oil, amounting to one half of their own weight: when triturated with water, they yield a cooling and nutritive milk; and boiled into a jelly, they are said by BECHSTEIN to be a very efficacious remedy for curing a retention of urine.

3. The *verrucosa*, or Watered Gourd, which is reared in America as a culinary vegetable; its young fruit is eaten boiled, and frequently mixed with wheaten flower in the baking of bread, to which it imparts a yellow colour, but an agreeable taste.

4. The *Melopepo*, Erect Gourd, or Squash. It has a long erect

stalk, several feet in height, which becomes bushy towards the top. It produces a knotty fruit, of a moderate size, and is used like the preceding species.

5. The *lignosa*, Ligneous-shelled Gourd, or Calabash, which has long trailing stalks, extending along the ground in every direction. Its smooth roundish fruit is provided with hard woody shells.

All these species of the Gourd have several varieties, and the fruit of each frequently changes its form. They are raised from seed, set annually in the month of April, or in the beginning of May. But, if the plants be forwarded in a hot-bed till they are a month old, they will produce fruit six weeks earlier, and mature comparatively sooner. The first species, or Bottle-Gourd, however, seldom ripens in Britain without the aid of artificial heat. Hence these plants are in our climate cultivated chiefly for curiosity, but in the East and West Indies, Bottle-Gourds are sold in the markets, and constitute, during the summer months, the principal food of the common people, who boil and season them with vinegar; and, sometimes filling the shell with rice and meat, prepare a kind of pudding. These shells are employed as flasks for holding water, and likewise converted into spoons, funnels, and even hats. Lastly, it is remarkable, that the stalks of the different species of the gourd contain a considerable proportion of nitrous particles, and might therefore become useful in the manufacture of salt-petre.

GOUT, or Podagra, a disease of the Proteus-kind, thus defined by Dr. Cullen: It is hereditary, and commences without any apparent external cause, but is in most instances preceded by indigestion, or other affection of the stomach; its paroxysms are ushered in with fever, pain at the point, generally, of the great toe, always attacking the joints, and chiefly those of the feet or hands: it returns at intervals, often alternates with indispositions of the stomach, or other internal parts.

Forerunners of the Gout: Indigestion often returning; thick sediment in the urine, sometimes for a whole year previously to the paroxysm, while that fluid emits the flavour of milk; vomiting, hiccough, and frequent pains of the forehead.

Peculiarities of the disease:.... Chalky excrescences appear on the joints, which shortly before death also cover the face; the gout infects dogs licking the sore or tumefied parts of their master, and according to some authors, it may likewise be communicated by clothes: it occurs most frequently in the spring; is often connected with the stone or gravel: and has sometimes been confounded with acute rheumatism.

Causes: Acid food, especially sour cherries; the immoderate use of fish, sugar, wine, cyder, and spirituous liquors; in short, luxury and debauch of every kind; suppressions of diarrhœas, dysenteries, or the hemorrhoidal flux; repulsion of the itch, scurvy, or other cutaneous eruptions; sleeping on fresh hay, &c.

Prevention and Cure: Although this obstinate disease has generally been considered as incurable, and thus become too often the boon of the most ignorant pretenders, yet we believe that the want of success in the profession, must be ascribed partly to that fashionable superficial treatment which constant-

ly aims at alleviating urgent symptoms, and partly to the difficulty of prevailing on those whimsical patients to pursue a steady and regular course of both medicine and diet, without which no radical cure of the gout can reasonably be expected.

During a paroxysm of the gout, the patient ought to be treated according to the state of his *fever* (which see); and, as the crisis of the disease generally takes place in three or four weeks, either by transpiration of the pores, or the discharge of urine, those secretions should be promoted by the mildest sudorifics and diuretics. Hence diluent drinks, such as barley-water in which sal ammoniac has been dissolved, in the proportion of one dram to each pint, should be liberally drank; but, where impurities in the first passages are suspected, gentle emetics may be administered; and if fullness of blood prevail in the vessels, venesection will perhaps be advisable. Marino, an Italian physician, prescribed for his gouty patients half a pound of olive oil, to be swallowed several times a day, with uncommon success: but we apprehend, that few persons will be inclined, or able, to take such profuse draughts. Meanwhile, the parts affected should be carefully covered with flannel: and the following applications used, which have occasionally been found of great service, in abating the most excruciating pain, viz. oil of wormwood; or Peruvian balsam dissolved in alcohol; or a solution of sal ammoniac, in white wine; or a cataplasm made of elder flowers, boiled in cream, and applied as hot as the patient can bear it; or oil of wax dropped on the part affected: or the skin of an eel; or liniments consisting of vinegar and soap; or the leaves of the Rough Bindweed; or even fresh horse-dung, &c. all have, in particular cases, been employed, and found productive of good effects. Nevertheless, we by no means recommend these remedies to be indiscriminately or promiscuously used, as the propriety and safety of their applications should be determined by professional advice.

When the gout retreats to more dangerous, internal parts, such as the breast and stomach, it is generally attended with vomiting, which [if violent, and in an elderly person, may be restrained by warm wine and water, warm brandy toddy, or by a tea-spoonful of æther in a wine glass full of water: but if the subject be young, and the pulse true and full, bleeding is a better remedy.] As soon as the stomach is composed, small doses of camphor, or vitriolic æther, internally, will be of essential service to allay the spasmodic action of the viscera. At the same time, sinapisms should be applied to the soles of the feet, and the lower extremities kept warm; a treatment by which the pain, as well as the seat of the disease, easily returns to its former place.

Various expedients and plans of regimen have been devised, in order to prevent, or retard, the fits of the gout. As we cannot enter into the peculiarities of different constitutions, we shall here briefly point out that mode of living which will, in general be found the most conducive to the purpose.....Temperance, in the strictest sense, total abstinence from acid, fermented, and spirituous liquors, and a very moderate use of wine are the principal circumstances to be attended

to by the gouty; but, in their food also, they should be extremely careful, and avoid all fat, rancid provisions. Spices, pickles, and stimulating dishes, in general, are the most powerful promoters of this painful disease; while hot suppers, late hours, and long sleeping in feather-beds, are its greatest nursery. Hence, persons liable to attacks of the gout, ought attentively to observe whatever agrees or disagrees with their digestive organs; for, as long as their stomach duly performs its office, there is reason to hope for a favourable change.... Moderate exercise should likewise, on no account, be neglected; because excessive fatigue and long-continued application to intense study, are equally detrimental.... Fear, violent grief, and an irascible temper, ought to be vigilantly controlled by the calm reflections of reason....Beside all these precautions, however, it will be useful to adopt some particlar rules of diet and regimen, in order to counteract the constitutional predisposition to that formidable disease.... With this intention, we from experience recommend the constant use of *barley bread*, and to bilious individuals, *mare's milk*, or the whey obtained from it after coagulation. Large doses of ginger, from one to four or six drams pulverized, and boiled in cow's milk for breakfast, have lately been found an excellent preventive, [by Sir J. BANKS.] Absorbent powders, consisting of two scruples of calcined magnesia, with purified kali and powdered rhubarb, from three to five grains of each, have likewise been taken with considerable advantage during the intervals of gouty fits; but this medicine ought to be repeated for several weeks, or even months, at least every other morning, according to the nature of the case.

Lastly, there is sufficient reason to conclude, that the internal use of the *marine acid*, or spirit of salt diluted with water, if continued for a proper length of time, and aided by bathing the legs daily in water saturated with a small proportion of the same acid, would greatly tend to prevent the return of the disease. Indeed, Dr. WOLLASTON has discovered, that gouty matter consists of a peculiar *(lithic)* acid which is supposed to be generated in the human body, and combined with the *mineral* alkali: consequently, as the marine acid has a greater attraction for this alkali than the lithic acid (or that which contributes to the formation of the stone in the bladder), it appears to be a reasonable inference, that the generation of chalky matter may be counteracted by the copious use of that acid, both internally and externally, which would preferably combine with the mineral alkali, and thus deprive the lithic acid of its nucleus or basis.

[Every gouty person should read Dr. WARNER's treatise on this disease, as it contains an excellent system of directions, the result of observations and of experience upon himself. The theory which he gives of the complaint is indeed absurd, as might be expected from the time in which he wrote, but the practice he advises is certainly highly proper. The Editor has had so much experience of the efficacy and utility of his prescriptions, that he thinks proper to insert them, in order that they may be kept in families.

1. *Anodyne Tincture.*

"Take of opium six drams....

Soap of tartar and Castile soap, of each half an ounce; nutmeg powdered, one dram; camphire, three drams; saffron, two scruples; sweet spirit of sal ammoniac, nine ounces. Digest all these ingredients in a Florence flask in a sand-heat for ten days, shaking it now and then till the last day or two, and then pour it off clear and stop it up for use."

The soap of tartar and Castile soap may be safely omitted, as they add nothing to the virtues of the medicine.

Dr. WARNER says, "Of this noble medicine, which no gouty man should ever be without, take thirty or forty drops an hour before it is wanted to operate, in a glass of strong mint water, after nothing hath been received into the stomach for an hour and a half: and if in an hour or two after taking it, the pain is not greatly abated, take twenty more, and drink sometime after of warm sage tea at pleasure. The number of drops must be proportioned to the violence of the pain, and repeated every night that the pain requires it; abating two or three drops at a time, as the pain abates, till the dose is reduced to ten or a dozen, when the patient may desist at once from any more: and thus the fit which might otherwise last a month, or two, or three, will be cured in a fortnight, and the patient enjoy ease and sleep. When the pain hath been so very intense, as that I have thought it necessary to add the second dose as above directed, and yet was apprehensive that I might be rather heated too much, from a larger quantity than the additional twenty drops, and that these might not be sufficient to answer the intention, I have joined seven, eight or nine drops of laudanum: and in the like case I have sometimes taken fifteen drops of it instead of the second dose of the Anodyne Elixir.

2. *Purging Tincture.*

Grated rhubarb, orange peel, caraway seeds bruised, each one ounce. Infuse these ingredients in a quart of white wine for three days: decant and take half a wine-glass full, or the quantity that will answer, when sitting down to dinner.

The above prescription is also an easy purgative in other diseases, and in cases of costiveness.

3. *Cordial for the gout in the stomach.*

Raisins sliced and stoned, half a pound; Senna, two drams; Coriander and Fennel seeds, each one dram; Rhubarb sliced, one ounce. Infuse these ingredients in a quart of brandy, then strain, and add a pint more to the ingredients, and after standing sometime, decant and mix the first and last tinctures. The dose is four or five spoonsful in as many of hot water, to be repeated if necessary in half an hour, until ease be procured.]

GOUTWEED, HERB-GERARD, ASH-WEED, or GROUND-ASH, *Ægopodium Podagraria*, L. an indigenous perennial plant, growing in orchards, gardens, pastures, and hedges, and flowering in the months of May and June. This plant has received its name from its supposed efficacy in relieving the gout. Its leaves are very tender, and may be eaten early in the spring among other pot-herbs; being possessed of nutritive rather than medicinal properties. Cows, sheep, and goats, are remarkably fond of the gout-weed, but it is refused by horses.

GRAFTING, a term in gardening, which signifies the taking a shoot from one tree, and inserting it into another, so that they may closely unite, and form one trunk.

Grafting has been practised from the most remote antiquity; but its origin and invention are differently related by naturalists. The great aim of this useful art is, to propagate any curious sorts of fruit-trees, to insure the growth of similiar kinds, which cannot be effected by any other method: for, as all the good species of fruit have been accidentally obtained from seeds, many of these, when sown, will degenerate, and produce bad fruit. But, when shoots are taken from such trees as bear good fruit, they will never change their kind, whatever be their stock, or the tree on which they are grafted.

Mr. Bradley observes, that the stock grafted on is only to be considered as a fund of vegetable matter, which is to be filtered through the cyon, digested and brought to maturity, as the time of growth in the vessels of the cyon directs. A cyon, therefore, of one kind, grafted on a tree of another, may be rather said to take root in the tree on which it is grafted, than to unite with it: for it is obvious that the cyon preserves its natural purity, though it be fed and nourished by a mere crab.

[The experience of J. Cooper is opposed to this generally adopted theory. See Apples.]

The grafts or cyons with which this operation is effected, should be of the last summer's growth, from the outside branches; firm and well ripened; and selected from healthy trees. The graft is always the middle part of each shoot, cut to five or six inches in length, or so as to have four or five good eyes, or buds, but should be preserved at full length, till grafting time.

The proper tools and other materials used in grafting, are: 1. A strong knife for cutting off the heads of the stocks, previous to the insertion of the graft; also a small hand-saw, for occasional use, in cutting off the heads of large stocks; 2. A common grafting-knife, or strong sharp pen-knife, for cutting and shaping the grafts ready for insertion; also to slope and form the stocks ready for the reception of the cyons; 3. A flat grafting chisel, and small mallet, for clefting large stocks, in cleft-grafting; 4. A quantity of new bass-strings, for bandages for securing the grafts, and promoting their speedy union with the stock; and 5. A quantity of clay, for applying closely round the grafts after their insertion and binding, to defend the parts from the influence of the sun, winds, and wet weather, or from being affected by cold. For this purpose, a kind of stiff loamy mortar may be prepared of strong fat loam; or any other tough clay may be substituted; to which may be added a fourth part of fresh horse-dung, free from litter, and a small portion of cut hay, with a little water, well mixed: the whole should be properly beaten with a stick, and thus incorporated.

This operation should be repeated, according to the nature of the clay, and performed several times during the first day; the composition being still moistened with water for six or seven days successively, at the end of which time it will be fit for use.

There are various other modes of engrafting, which are termed

whip-grafting, or tongue-grafting, cleft-grafting, crown-grafting, root-grafting, check-grafting, side-grafting; and, lastly, grafting by approach, or INARCHING (to which we refer. Besides this last-mentioned, the following are most commonly and successfully practised:

1. *Whip-grafting*, or *tongue-grafting*, is generally performed in nurseries, upon small stocks, from a quarter of an inch to half, or a whole inch in diameter. The stock, and cyons or grafts, should always be of the same size, or approach as near to the same size as possible. They are both to be sloped off a full inch, or more, and then tied closely together. This method may be much improved, by performing what gardeners call *tongueing*, or *tipping*; that is, by making an incision in the bare part of the stock, downwards, and a similar slit in the cyon, upwards; after which they are to be carefully joined together, so that the rinds of both may meet in every part, when a ligament or bandage of bass is to be tied round the cyon, to prevent it from being displaced; and the whole is to be covered over, or coated, with the clay above described.

2. *Cleft-grafting*, or *slit-grafting*, as gardeners differently term it, is performed upon stocks from one to two inches in diameter. The head of the stock being carefully cut off, in a sloping direction, a perpendicular cleft, or slit, is to be made about two inches deep, with a knife or chisel, towards the back of the slope, into which a wedge is to be driven, in order to keep it open for the admission of the cyon: the latter must now be cut in a perpendicular direction, and in the form of a wedge, so as to fit the incision in the stock. As soon as it is prepared, it should be placed in the cleft, in such a manner that the inner bark of both the stock and cyon may meet exactly together. It is then to be tied with a ligature of bass, and clayed over, as is practised in whip-grafting, three or four eyes being left in the cyon uncovered. The proper season for this mode of grafting is the same as for the preceding, viz. the months of February and March: towards the latter end of May, or the beginning of June, the junction of the graft and stock will be completed, and the latter begin to shoot; when the clay may be taken off, and, in the course of a fortnight or three weeks, the bandages may be removed.

[Mr. WM. FAIRMAN, of Kent county, England, has inserted in the 20th vol. of the *Trans. Soc. Arts, London*, an account of his mode of "*extreme branch grafting*," upon old decaying trees, which promises to be a very great acquisition to those who take pleasure in cultivating fruit.

The process is as follows:

"Cut away all spray wood, and make the tree a perfect skeleton, leaving all the healthy limbs: then clean the branches, and cut the top of each branch off, where it would measure in circumference from the size of a shilling to about that of a crown piece. Some of the branches must of course be taken off where they are a little larger, and some smaller, to preserve the canopy or head of the tree: and it will be necessary to take out the branches which cross others, and observe the arms are left to fork off, so that no considerable opening is to be perceived when you stand under the tree, but that they

may represent an uniform head.... When preparing the tree, leave the branches sufficiently long to allow of two or three inches to be taken off by the saw, that all the splintered parts may be removed.

The trees being thus prepared, put in one or two grafts at the extremity of each branch; and put on the cement described below, and tie with bass or soft strings.... Sever the shoots or suckers from the tree, until the succeeding spring, to make good the deficiency, in case some grafts do not succeed. Additional grafts may be inserted in the sides of the branches; as at A, A, A, A, A, A, or where they are wanted to form the tree into a handsome shape.

The cement for grafting.....One pound of pitch, one ditto rosin, half ditto bees-wax, quarter ditto hogs-lard, quarter ditto turpentine, to be boiled up together, but not to be used till you can bear a finger in it.

Mr. Fairman objects to the mode of grafting at a short distance from the trunk or body of a tree, as the wounds are so large as to require several grafts which cannot firmly unite and clasp over the stumps, and consequently these wounds lay a foundation for after decay; or else they diminish the growth of the tree: whereas, upon the new plan, they will be larger in three or four years, than before the operation. The annexed cut will give an idea of Mr. F's new method.

Another new mode...The late Mr. A. C. Du Plaine informed the Editor that the following mode of grafting was long kept a secret in France. A limb of willow, three or four inches thick was buried in a trench deep enough to receive it, and at the distance of every four or five inches, holes were bored into which grafts were inserted, care being taken to make the bark of the graft and the limb into which it was inserted, touch; the lower part of the graft was pointed and the bark shaved off. The limb and the grafts were then covered with earth, and about two inches of the latter left above the surface. In process of time the limb rotted, and the grafts took root. The different grafts were then dug up, and transplanted.

Dr. Darwin explains the theory of grafting thus....“ It is the inosculation of the vessels of the graft with those of the bark and alburnum of the tree to which they are applied and bound.” *Phytologia*, Sect. 111. 7.

In grafting, Dr. D. says, “ it is necessary to apply the bark which contains or consists of the caudex of the young scion, exactly to the bark of the branch into which it is inserted or applied; and then all species of engrafting succeeds, whether by excision, or inoculation, or inarching. But I suspect, that where a single bud is inoculated, it has often failed from the operator having selected a *flower* bud instead of a *leaf* bud; which probably unites its caudex to those of the stock with less vigour, and certainly dies after it has ripened its seed; or by his holding the bud in his mouth, as he ascends the ladder, or while he makes the incision, and thus destroying it by heat, as I once observed. A *leaf bud* may in general be distinguished from a *flower bud*, by *its being sharper pointed and less spherical.*”

Dr. D. has many interesting and curious remarks upon the subject of grafting, which every one anxious to perfect his fruit should read.]

GRAIN, strictly speaking, signifies the fruit or seed, growing in a spike or ear; in which sense it comprehends corn of every kind, such as Wheat, Rye, Barley, Oats, &c. Of the preparation, culture, and preservation of these, we treat in their alphabetical series.

Grain also denotes the smallest weight used in England, and which is thus denominated, because it is regulated by the weight of a grain of wheat, selected from the middle of the ear, and well dried. The grain is employed for troy-weight, in the weighing of gold, silver, jewels, bread, and liquors.

The grain employed by apothecaries, is the same as that of goldsmiths (see Avoirdupois), though they afterwards vary with respect to the computation of greater weights arising from the aggregate of grains. Thus, with the former, twenty grains make a scruple, three scruples a dram, eight drams an ounce, and twelve ounces a pound.

Grain, is likewise applied to the figures, or representations of grains on stones, stuffs, leather, &c. Thus we say, in some marbles the *grain* is very fine, in others it is much coarser; Morocco has a richer, that is, a larger grain than shagreen, &c.

GRAINS, are the refuse of malt, which has been brewed or distilled. Immense quantities of this article are consumed in London and its environs, for the feeding of pigs,

100,000 of which were annually fattened, a few years since, by one extensive distiller. Cow-keepers in the vicinity of the metropolis likewise feed their cows frequently with grains, which produce indeed abundant milk, but of a very inferior quality. Hence we are of opinion that such refuse, especially that from brew-houses, might with greater advantage be employed in the process of making vinegar; for, by bruising the grains so as to reduce them to a pulp, adding the necessary quantity of tepid water, together with leven, yeast, or other fermentable substances, they might easily be converted into a strong acid.

GRANARY, a building in which corn is deposited, especially when designed to be kept for a considerable time.

In constructing granaries, the principal objects are, strength or solidity of the edifice, and its exposure, to the most drying winds.... In the county of Kent, previously to removing the corn to such a magazine, it is tossed with a shovel from one end of a large room to the other; by which means the lighter substances fall into the middle, while the ripe grain only is collected at the sides or extremities of the room. The corn is then *screened*, and conveyed to the granaries, where it is spread to the depth of half a foot on the floor, and turned twice in the week: the operation of screening is repeated once a week. At the expiration of two months, the corn is heaped up to the thickness of a foot, for a similar period, during which it is turned once, or, if the weather be damp, twice in the week, and is also occasionally screened. At the end of five or six months, the heaps are enlarged to the height of two feet, and turned once or twice in a month, the operation of screening being likewise from time to time continued.

When grain has thus lain for one year, the quantity is increased to the thickness of $2\frac{1}{2}$ or 3 feet; it is turned once in the course of three weeks or a month, and screened accordingly. At the expiration of two or three years, it is moved only once in two months; and screened every quarter: but in proportion to the length of time it is kept, the turning, &c. should be more frequently repeated, in consequence of which the grain will be much improved. In storing corn, it is requisite to leave an area of a yard in width on every side of each heap, into which the corn should be tossed as often as appears necessary. In the Kentish granaries two square holes are made at each end of the floor, and a circular one in the middle of the building, through which the corn is shifted from the upper rooms into those below, and again from the lower rooms into the upper ones, in order that it may be the more effectually turned and aired. The screens or frames employed for sifting the corn, are made with two partitions, for the purpose of separating the pure grain from the dust, which falls into a bag. By these precautions, corn has often been preserved sound and pure for thirty years; and it is a circumstance worthy of notice that, though by long keeping the grain decreases in bulk, yet it will yield proportionably more flour, and the bread will likewise be whiter and more wholesome; as the superfluous moisture

only evaporates during the frequent airing.

M. Du Hamel, and Dr. Hales, have recommended various contrivances for ventilating, or introducing fresh air through corn deposited in granaries, with a view to preserve it sweet and dry, as well as to secure it from weevils or other insects. This object is to be effected, by constructing granaries with lattice-work, and hair-cloth at the bottom. The ventilators for supplying fresh air may be affixed to the wall, either within or on the outside of the granary, beneath the floor, or in the ceiling; but, in the former case, it will be necessary to place the handle of the lever externally, as otherwise the person working the machinery would be exposed to suffocation, when the corn is fumigated with sulphur for the expulsion of weevils. Small moveable ventilators may be constructed on this plan, for ventilating corn in large bins deposited in granaries. Similar contrivances may be applied to the lowest floors of small magazines, so as to be worked by men standing on the ground, either within or without the building.

In the 8th vol. of the "*Letters and Papers of the Bath and West of England Society*," &c. Thomas South, Esq. gives a description of a cheap and efficacious ventilator, for preserving corn on ship-board. This machine consists of a forcing pump, with perforated tubes annexed to it; and by means of which fresh air may be communicated to every part of the cargo....Mr. South's air vessel is, for the sake of cheapness, confined to a diameter of 10 inches; but he observes that, if the latter be enlarged to 14 inches the effect of the machine will be nearly doubled; and if the length of the trough (by the suction-valve) be extended ten inches, a power will be obtained capable of ventilating a cargo of 400 tons in the course of one hour. The price of a ventilator on the smaller plan, is computed by Mr. South, at about five or six guinea: one on a larger scale might perhaps amount to twenty guineas; a sum which, in either case, enhances the price of corn only at a rate of less than four-pence per quarter, on the first cargo. These machines, if well painted and properly preserved, will continue useful for many years.... A more minute account of Mr. South's invention is contained in the volume of the "*Letters*," &c. before quoted, where its various parts are specified and illustrated by an engraving.

To preserve corn in barns or granaries, Dr. Darwin observes: It is requisite first to make them dry, and, secondly, to keep them in that state; because no seeds will vegetate without moisture. In order to dry seeds, the heaps should be frequently turned over in warm dry weather: hence, in this climate, the doors and windows of granaries should open towards the south, for the reception of the warmth, of the sun, with air-holes round the building, for sufficient ventilation; and which apertures ought to be sheltered from rain or snow, by boards placed for that purpose on the outside. Heaps of corn should be surrounded with planks, in order to prevent them from touching either brick or stone walls; because, when cold northerly winds are succeeded by moist

and warm south-west winds, such walls frequently precipitate the moisture from the atmosphere, and communicate it to those bodies which are in contact with them.... According to Mr. Tull, the safest method of preserving a large quantity of wheat is, to dry it gradually in a malt-kiln on a hair-cloth, with no other fuel than clean straw, and with a heat scarcely exceeding that produced by the rays of the sun... In this temperature, the grain is to remain from 4 to 12 hours, in proportion to its previous dampness. The vegetative principle of the corn is not destroyed by this process; as instances have occurred of its growing when sown, after it had been thus kept for seven years.

With respect to the best method of securing grain from insects, &c. we refer the reader to the article Corn.

GRANATE, or Garnet, a genus of fossils, classed among siliceous earths, and containing three species, the principal of which is the crystallized granate. It is ranked among precious stones, but is one of the least valuable, as it varies in its colour, and the form of its crystal, more than any other; being sometimes of a deep red, sometimes yellowish or purplish, and, at others, of a brown or black tint. It is inferior both in lustre and hardness to all other gems, and yields to the file, though it will strike fire againts steel.

Granates are either *oriental* or *occidental*: the former are brought from the East Indies, and the latter from Spain, Bohemia, and Silesia. They are found of various sizes from that of a large pin's head, to one inch in diameter, but seldom exceed one-fifth of an inch.

GRANITE, in Natural History, a genus of stones consisting chiefly of quartz, feldspath, and mica; forming rough and very large masses of great hardness, yielding fire with steel, not fermenting with acids, and slowly but imperfectly calcinable in a great heat. The most stupendous ridges or chains of mountains on our globe, are composed of this fossil, which presents three distinct species.

1. The hard white granite, with black spots, commonly called *moorstone*. It is much used in London, for the steps of public buildings, and on other occasions where great strength and solidity are required.

2. The hard red granite, variegated with black and white, which is common in Egypt and Arabia.

3. The pale whitish granite, diversified with black and yellow. This is sometimes found in strata, but more frequently in loose nodules, and is employed for the paving of streets.

Granites take a good polish; hence the Egyptians formerly employed them, and the Italians still use them for working large pieces of ornamental architecture; a purpose to which this fossil is uncommonly well adapted, as it is not liable to decay in the air. Indeed, there are columns, statues, and other monuments of antiquity erected of granite, and preserved to this day entire, though some of these relics have withstood the test of time for upwards of 4000 years!

GRANULATION, a chemical process, by which metallic substances are reduced to small grains. It consists simply in pouring the melted metal into cold water, from a considerable height. Lead or tin may be granulated, by pouring

them when melted into a box, the inner surface of which is to be rubbed with chalk, and the box shaken till the metal becomes cold. The design of granulation is chiefly to facilitate the combination of metals with other substances: because, from their great ductility, they are incapable of being pulverized, and liable to contract impurities from the tedious operation of filing....See also LEAD and SHOT.

GRANULATION is also applied to wheat when divested of its husk, and other surrounding parts so that the heart or middle of each grain only is preserved entire. In this state, it is called *Semolina*, and often sold by grocers: it affords an excellent and nutritive food, especially for children and invalids.

GRAPES are the fruit of the VINE, on the culture of which we shall treat under that head.

Grapes are excellent fruit, and well calculated for cleansing the humours, on account of their laxative properties, by promoting the natural evacuations, without debilitating the body. They are, however, remarkably flatulent, and ought to be avoided by those who are liable to eructations, and other complaints arising from bad digestion....It is asserted, that the small stones of grapes, when swallowed together with the juice in large quantities, have occasioned the most painful and inveterate colics.

Sour grapes ought never to be eaten, as they easily produce gripes, and even the dysentery. [See VINE.]

GRASS, in botany, is defined to be a plant or vegetable which has simple leaves, a jointed tubular stem, a husky calyx called *glume*, and the seed of which is single.

Grasses are divided into two classes, leguminous and culmiferous. To the former belong wheat, barley, oats, and all other grain, for the various modes of cultivating which, the reader will consult the articles in their alphabetical series.

Culmiferous grasses may likewise be subdivided into two classes, for agricultural purposes; hence it is of importance that every farmer should distinguish. 1. Those which run to seed-stalks in a manner similar to the common annual species of corn, and the leaves of which gradually decay in proportion as they approach towards perfection, and totally wither when the seeds are fully ripe. In this division may be ranked Ray or Rye-grass, to which may be added the Sweet-scented Spring Grass, the Dog's-tail-grass, and the Bent-grass. 2. Those, the leaves of which grow after the seed-stalks are formed, and retain their succulence and verdure during the whole season. Such are the Fescue and Meadow Grasses, that continue green and succulent, even after the seeds have attained to maturity, and while the flower-stalks are fading.

We cannot here specify the places of growth, proper soils, or the modes of cultivating the different grasses; but, as many farmers are not sufficiently acquainted with the peculiar names of those plants, and as little improvement can be made in this important branch of husbandry without such knowledge, we shall here state the proper appellations of the best *cultivated* and *uncultivated* grasses re-

ferring the reader to the various articles as they occur in their alphabetical order.

I. Cultivated Grasses.

1. Red Darnel, or Ray-grass : *Lolium perenne*, L.

2. Crested Dog's-tail-grass : *Cynosurus cristatus*, L.

3. Meadow Fescue-grass : *Festuca pratensis*, L.

4. Meadow Fox-tail-grass : *Alopecurus pratensis*, L.

5. Smooth-stalked Meadow-grass : *Poa pratensis*, L.

6. Roughish Meadow-grass : *Poa Trivialis*, L.

7. Soft Brome-grass, Lob-grass, or Oat-grass : *Bromus mollis*, L.

8. Meadow Soft-grass : *Holcus lanatus*, L.

9. Sweet-scented Spring-grass : *Anthoxanthum odoratum*, L.

10. Timothy-grass: *Phleum pratense*, L.

II. Wild, or Uncultivated Grasses.

1. Sheep's Fescue-grass : *Festuca ovina*, L.

2. Hard Fescue-grass : *Festuca duriuscula*, L.

3. Water Hair-grass : *Aira aquatica*, L.

4. Annual Meadow-grass : *Poa annua*, L.

5. Flote Fescue-grass : *Festuca fluitans*, L.

6. Reed Meadow-grass : *Poa aquatica*, L.

7. Mountain Melic-grass : *Melica nutans*, L.

8. Creeping Bent-grass : *Agrostis stolonifera*, L.

9. Marsh Arrow-grass : *Triglochin palustre*, L. and

10. Sea Arrow-grass : *Triglochin maritimun*, L. which is peculiarly calculated for sheep-walks.

These are the principal grasses, cultivated and wild, which merit the attention of agriculturists ; but, as these seeds, as well as those of other grasses drop from the husks a very short time after, and many of them, before they are ripe, those who wish to preserve such seeds, ought to watch them diligently ; as the neglect of a very few days will deprive the cultivator of an opportunity of collecting them. The Tall Fescue-grass, however, forms an exception : for, as its seeds are not fertile, it can only be propagated by parting and planting the roots.

The culture of grasses has been particularly attended to within these few years ; and, as they support many of the most useful quadrupeds, the art of increasing the quantity of leaves round the roots of grasses, is deservedly regarded as an object of great importance. It simply consists in eating off the central stem by sheep, horses, or other cattle, early in the season: hence Dr. Darwin justly observes, that new leaves are produced around the first joint of the stem thus grazed. This practice is especially useful in low meadows, and affords a double profit, if continued till the month of May ; as, in moist situations, a crop of hay is certain to succeed, which by this method, will not only be much finer, and more copious, but the expense that must otherwise have been incurred in providing hay, may in a great measure be saved by making use of such early grass.

[The Rev. and learned Dr. Henry Muhlenberg of Lancaster, Pennsylvania, has paid more attention to the natural history of the grasses of the United States, than any other person, and it is much

to be wished he would favour us with the result of his valuable researches on this subject. But he has been equally attentive to the cultivation of some of the most useful species of grasses, as well domestic as imported. "According to his trials they thus range in point of merit.

1. *Tall Meadow Oats*, or Tall oat-grass, *Avæna elatior*, imported.

2. *Tall Fescue Grass*, *festuca elatior*, native.

3. *Meadow Fox-tail-grass*, *Alopecurus pratensis*, imported.

4. *Meadow-soft-grass*, or Yorkshire grass of the English, *Holcus Lanatus*, native.

5. *Timothy*, or meadow cat's-tail-grass, *phleum pratense*.

6. *Rough Cock's-foot-grass*, [orchard grass] *dactylis glomerata*, native.

7. *English or Common Rye-grass*, *lolium perenne*, imported.

8. *Sweet - scented - vernal - grass*, *anthoxanthum odoratum*, imported.

9. *Reedy Cinna*, *Cinna Arundinacea*, native.

10. *Brome-gruss*, two species, *bromi*. Timothy should be cultivated with the nine other kinds of grass enumerated above, in bottoms or meadows, which can be watered. For upland meadows, Dr. M. prefers red clover, *trifolium pratense* ; 2. Lucerne *medicago sativa* ; and 3. Sainfoin *hedysarum onobrychis*.

1. The *Tall-Meadow* oats was imported many years ago by Dr. M. and is now spreading fast through the state of Pennsylvania. It is the *Wiesenhafer franzosich ray-grass* of the Germans. The English rye-grass or ray-grass is the *Lolium perenne*, a very different plant. A very good figure and description is given of the *avæna* in Sherber's treatise on grasses, vol. 1. tab. 1. Agreeably to the experience of Dr. M. this grass is of all others the earliest, latest, and best grass for green fodder and hay. It blossoms about the middle of May, with red clover, and the seed ripens a month after. It grows best in a clover soil, and rises to a height of from five to seven feet. It ought to be cut in blossom about the end of May. The seed may be sown in the fall or spring, with or without grain, and must be brushed in, or lightly harrowed. If mixed with clover, it will make good upland meadow. Horned cattle prefer this grass to all others. But some horses do not relish it green." *Trans. of Agric. Soc. New-York*. In addition to the above, Dr. M. informs the editor, that the ray-grass must be pastured or cut at least three times in a season ; if suffered to grow old, it will become strawlike. When intended for hay, it must be salted.

2. *Fescue Grass* (Tall.) A native perennial grass of the United States. It is very luxuriant and productive, but rather coarse.... Cows are fond of it, but horses do not relish it. It grows in moist meadows and in woods. The leaves are broad, stem very high (sometimes six feet), flowers in July.

3. *Meadow-fox-tail-grass*, *Alopecurus Pratensis*. Root perennial, stalks from a foot to eighteen inches high. Mr. Swayne says it suits low meadow grounds or boggy places which have been drained. Sheep, horses and goats eat it, but cows and hogs are not fond of it.

4. *Meadow soft-grass*, *Holces Lanatus*. The root is perennial, stems from two to three feet high. The velvet-like softness of this plant, and the redness of the opening

panicle, render it very conspicuous in the field. This grass is esteemed by Mr. MARSHALL, (*Rural Economy of Yorkshire*) as excellent for promoting the growth of young heifers, and cattle of every kind, but not good for horses....Indeed it has been accused of exciting the discharge of a morbid quantity of urine in horses. YOUNG's *Annals*, vol. 20, p. 105.

5. *Timothy Grass....Phleum Pratense*....A well known favourite and native grass of the Northern and middle United States. According to Mr. STRICKLAND, (*Trans. Board of Agric.*) It is the same as the English *Cats tail grass*, except that the Timothy is about a fortnight earlier than the cats tail, the effect of the change of seed and climate.

Dr. MUHLENBERG, we have seen, accords in this opinion.

Mr. DEANE (*N. England Farmer*) says " it obtained its name, by being carried from Virginia to North Carolina, by one TIMOTHY HANSON." *Is it possible to ascertain the accuracy of this statement? By what name is it known in Virginia?*

Timothy suits a moist low ground, and if somewhat shady it may be sown *alone*. On upland it is generally sown with red clover, but as these grasses ripen at different periods, it certainly is bad economy to sow more Timothy than will answer to support the clover which is very apt to lodge. But as a combination of Timothy and Clover is preferred by horses, and the former tends to correct the tendency of the latter to injure their wind, the best way is to sow it with grain, to roll the ground and to permit it to stand alone after the grain comes up. It may then be mixed with clover hay in alternate layers.

The Timothy will grow about four inches high in the autumn, and in the succeeding spring the grain will shelter it from the sun, until after harvest, when it will have acquired sufficient strength to bear the heat of our summers. The first year, after grain harvest it may be slightly pastured, but the second year it must be kept up for hay, of which it will yield an abundant crop if the ground has been well prepared. It may be pastured afterwards, and if the land be manured every spring, will keep in the same ground many years.

Timothy is commonly cut too soon, that is, before it has blossomed ; it is then bitter and apt to bleed, which weakens the stalk and frequently occasions the death of the plant; but if permitted to stand until in full blossom, the young leaves will be seen coming out from near the surface, which, if the grass be then cut, will start up with vigour, stand the sun, and yield a fine pasture.

It is a common opinion among farmers, that Timothy hay is better for being heated, or mow-burned: but Mr. JOSEPH COOPER assures the editor that this is a mere prejudice, and unfounded in fact.... He justly remarked, " that cattle are the best judges of good hay, and that repeated attention to the subject has convinced him, that they will seldom, if ever leave any part of bright Timothy hay which may be put before them, while, on the contrary, a part of mow-burned hay will frequently be left. He also added an important fact: viz. that bright hay, even if made of coarse grass, will give yellow butter, while the best Timothy hay if

mow-burned, will always produce white butter.

One acre of Timothy hay will yield thirty bushels of seed, and on good upland, two tons of hay.

Timothy is spoken of in terms of contempt by SWAYNE, SOLE, and other pratical English writers, the reason of which is, that the heat of the sun in England is not great enough to bring this plant to perfection.

6. *Orchard Grass. Rough cock's-foot grass, Dactylis Glomerata.* Is a native of the United States, and is a strong robust and productive plant. It is ripe before timothy, flourishes well in orchards in the shade, (whence its name,) and lasts three years. It should be cut when young, either for hay or fodder, as its stalk becomes coarse when permitted to grow old. SOLE in the 9th vol. of the *Bath Society Trans.* says it is refused by all cattle; but from this assertion, and from what he says of our favourite *Timothy*, he cannot be received as an authority for American farmers.....It is said that the American orchard grass is different from the grass known in Europe by that name.

7. *Ray-grass*, *Lolium perenne.* Wiry, with little foliage in upland pastures: but in rich meadows its foliage is abundant, and of rapid growth. It is an early grass.

8. *Sweet Scented Vernal Grass. Anthoxanthum odoratum.* Is common in our meadows, grows to the height of ten inches; it is an early grass and delights in moist soils.

9. *Reedy Cinna. Cinna arundinacea.* A grass the size of oats, root perennial.

Holcus odoratus. Seneka-grass of the western country. It is also a native of Europe and Asia. The root is perennial, jointed and creeping. This grass has a sweet smell, and collected in some places to lay among clothes and linen, and hung over beds, according to LINNÆUS, to procure sleep.

Green Grass, *Poa Viridis*, is a native of the United States, and especially of Pennsylvania, where it grows in all meadows, and rich soils. Dr. MUHLENBERG says, it is not described by LINNÆUS though nearly allied to his *poa angustifolia.* It may be easily known by the following description. "Culm (or haulm) erect and round (columnar) pannicle diffuse, spicules five flowered and hairy at their base." Cattle are very fond of this grass, if cut when the blossom opens. It produces less than *Avena elatior* or tall meadow oats, but horses prefer it. It continues green until even after frost, and when all other herbage is destroyed; and if manured, will continue for ever. The fine grazing farm of Mr. Wm. WEST, of Upper Derby, Delaware county, consists entirely of this grass. Mr. W. finds it necessary to sow clover thinly upon the green grass sod every three or four years, to correct a slight tendency which green grass has to bind the soil.... When the *Green Grass* appears upon meadows made by banking out rivers, care must be taken to secure a supply of water; otherwise, according to Mr. J. COOPER, the ends of the seeds (not the tips of the blades, as stated in vol. ii. p. 52) will become affected with a black spear, about one fourth or one half inch in length, similar to the smut on rye, and cause a loss of the hoofs of cattle that eat the grass.

Blue Grass, *Poa compressa*, L. *Rehwasen* of the Germans, a native grass of the United States, having "a compressed oblique culm (or haulm) panicle squeezed, spicules round, (columnar) and eight

flowered." This is eaten tolerably well by cattle when young, and remains green until after frost. It binds the soil in the course of three or four years, so as to require ploughing up. This is often mistaken for the green grass, and both are called occasionally *Spear-Grass*, and wire grass.

Having already fully treated on clover both red and white in vol. 2d, there remains nothing to be said, except that wood ashes have been found in Penns. and Del. the best top dressing for land which it is wished to bring into white clover. To sheep raisers this fact is important; as white clover is known to fatten sheep speedily, and to give a fine flavour to the meat.

Herd-Grass. White top, Foul meadow grass of East Jersey. Dr. Muhlenburg informs the editor, he thinks this grass is the *agrostis stricta* of Wildenow. It is particularly adapted to wet low grounds. It mats and consolidates the surface, continues many years, excluding every other grass, and all weeds. Many worthless swampy spots in the low parts of the state of New-Jersey have been rendered valuable grazing grounds by this grass, loaded waggons having passed over places, which two or three years before sowing it, would scarcely admit an animal to walk through without sinking. It makes excellent hay, and cattle are said to prefer it to that made of either clover or timothy. It is more succulent than timothy, though not so coarse. The same bulk of herd-grass hay, will weigh one third more than the same bulk of timothy hay. Four tons in a common crop from one acre. It yields no second crop, but affords excellent late and early pasture. It was first brought to New Jersey from New England, by the late Wm. Foster, who resided near Mount Holly; and introduced into Pennsylvania about ten or twelve years since.

The *Red Top* and *White Top*, are only varieties of the above species of grass. The latter is the larger of the two. The red top is particularly valuable, as it will grow and sod the first year on banks, when no other grass will thrive.

Lucerne, *Medicago Sativa.* The Hon. Robt. R. Livingston has recorded some original and highly valuable experiments upon Lucerne, in the *Trans. Agric. Soc. New York:* by which it appears that it may be easily sown on a dry soil with oats and clover, and that its annual clear profit after deducting every expense, will exceed on the two first years 7 *l.* per acre. The ground must be highly pulverised to insure a good crop....He found also that it answers very well with red clover, and that it braves biting frosts of the spring, and the keen autumnal blasts, better than clover, or any cultivated grass of this climate. In England the deficiency of heat, prevents the lucerne from coming to perfection until the third year, hence the necessity there of sowing it in drills to keep down weeds....In warm situations, lucerne when sown with clover will be fit to cut before the clover rises to the scythe. The second crop in this case will be earlier on account of the clover which will consist almost wholly of it: because having escaped the wounds which the lucerne received, it will be ready to take the field before lucerne has recovered from its amputation.

Mr. L. advises as the result of his experiments:

1. Never to sow on ground that is not perfectly pulverised.

2. Not to sow till the earth has acquired a degree of warmth friendly to rapid vegetation, viz. in *May*.

3. To sow with no crop that will probably lodge.

4. If sown with buckwheat, to apply no gypsum or other manure, till the buckwheat be off.

5. When the quantity sown is small, and the farmer can afford to lose a crop, to give the ground one turn in the autumn, another in April, harrowing it fine, and a third the beginning of May, and then if the weather be mild and warm, sow, if the ground be in perfect tilth, otherwise give it another ploughing. Eighteen or twenty pounds of seed are not too much. Mr. L. prefers ground that had been manured and bore a potatoe crop the year preceding; but another mode by which the seeds will come up quicker, and with more regularity, is to manure early in the spring, and to plough and harrow the ground firm, when the weeds have sprung and got some head, and when the earliest kinds begin to blossom, plough again, and harrow fine; repeat this four times by the first of July; then the lucerne seed should be sown when the ground is dry, and rolled in: if committed to the ground when moist, the seed will swell, and if a dry season succeeds before they have struck root, they will whither away.

When lucerne turns yellow, it must be mowed, as the plants will come up free from the disorder.

Dr. Muhlenberg sows lucerne alone, like clover, after potatoes or Indian corn, or in preference after cabbage crops, about the second May, and observes, that when it can be fed green, it exceeds any other grass.

The following observations on this valuable plant. and on other useful grasses, by Mr. *De la Bigarre*, are taken from the *Trans. Agric. Soc. N. York*, and being the result of experience, deserves serious attention.

" Amongst a great number of grasses used for artificial pastures, I thought it my duty to select those which I presume the most suitable to this state, and most friendly to cattle, as far as I am able to judge, from my experience of the country.

This essay will be extended only to four of the perennial, considering the three others as annual, and less useful, which therefore require a separate treatise.

LUCERNE....It is not true that lucerne can grow every where: it requires a light but substantial ground, not too dry nor too wet: it delights in a deep and gravelly soil, or rich sand, where it may root down easily, rather upon a level spot, than on mountains or declivities. As much as possible I would chuse a situation sheltered by woods or hedges from the cold winds in the winter, and from burning breezes in the summer.

Tillage and sowing....The ground intended for lucerne, must be ploughed twice before winter, fifteen inches, or at least a foot deep.

In the latter end of March you plough it again, and dress it with a harrow before the day of sowing: the seed is buried in the ground by the harrow, taking care to fix chatwood or branches under and betwixt the teeth, in such a way as to facilitate the covering of the seed, without going too deep into the ground.

There are two ways for the sowing of lucerne: the first, by itself, which is the best: the second, mixed with barley or oats.....but observe not to mix lucerne with any other perennial.

Whether lucerne is sown by itself, or mixt with barley, take twenty pounds weight for an acre. If you chuse to sow it with barley, take the exact measure of the quantity of barley which you are used to sow upon one acre.....then put in that measure twenty pounds of lucerne seed, fill it up afterwards with the barley, that process will establish the just proportion.

If you intend to sow lucerne by itself, fill up the measure with sand or ashes over the above-mentioned quantity of seed, as that method makes the sowing easier and more regular.

When your barley is ripe, you may mow it as close as possible to the ground without any danger of hurting the young plants of your lucerne, of which you cannot expect but a very indifferent crop the first year. Do not let cattle feed upon it at that time.

The second year will give you two crops. In the beginning of the third year, as soon as the winter is over, you must harrow your lucerne about two inches deep when the ground is yet moist, in two or three different directions, in order to root out the weeds: Never mind nor be uneasy if your lucerne is torn to pieces by that hard dressing; the more it is torn the better it will grow: this is a fact of long experience, upon which you may rely.

Manure.....After the above dressing, you may manure your lucerne with greater advantage, by spreading over some new ground or mud taken from creeks and swamps, or employ some pulverized gypsum.

The best manure for lucerne which I know, is the dung of fowls and pigeon-houses, well dried by the sun, and reduced into powder; but it seems very scarce, and too difficult to be got in this country, although a great deal less of this last manure would be required, as in the proportion of one to nine. Dung of cows, horses, or of any other cattle, ought to be rejected as bad manure, upon lucerne, because they bring with them such a quantity of weeds, as to poison the best lucerne in the course of two years.

Produce ...The third year the lucerne has acquired its full strength, then upon a common average one acre will produce, *viz.*

The first crop,	2500 weight,
The second,	1400 do.
The third,	600 do.

After the third crop, let it be fed upon by your cows all the remainder of the fall.

Such a piece of lucerne will last from nine to ten years: but however great may appear the profit of that culture, there is a greater one after the lucerne is worn out: I mean the richness afforded to the ground by the roots of that plant; which is such that the first year the lucerne has been ploughed up, I was never able to raise wheat, which grew too rich, tall, luxuriant and lodging. Instead of wheat, then you must sow barley and oats.

Mowing....The most proper time to get good and tender forage, relished by the cattle, is to mow lucerne when in full blossom, or a little before the ripeness of the seed.

Another advantage of mowing

early, is to have the weeds cut down, which otherwise would come to seed, and spread over the field.

When the weather is clear, one or two days are sufficient to dry your lucerne hay; and by spreading over each row a thin bed of any straw (that of oats and barley is the best) you may carry your lucerne to the barn, without any danger of being heated or rotten. The straw so intermixed with lucerne, receiving the juicy emanations of it, becomes more palatable, and is eaten like the best hay by the cattle. It would be needless to observe what increase of food that process affords to a farm.

Disorder....In some uncommon summers, it happens that lucerne is attacked by caterpillars, or other insects. When this is the case, and you perceive the stems and the leaves turning pale, yellow, or fading, the only and best remedy is to mow instantly your lucerne, which will soon grow again, fine and free from those insects.

Sainfoin....It may be ascertained that sainfoin, considered like hay, is one of the most friendly foods to neat cattle; horses are particularly fond of it in the winter, when it furnishes them so strong a nourishment as to be a good substitute for oats.

It grows upon any kind of soil, except upon stony ground. Its most advantageous quality is to succeed in the poorest land, sandy loam, and upon declivities, of which it keeps the ground.

Tillage and Sowing....Two tillages as deep as possible, according to the nature of the ground; never mind if the plough turns up a part of that reddish and yellow stratum which they call unvegetable among the farmers.

It is sown by itself, or mixed with the same grains pointed out for lucerne; but as the seed of sainfoin is bigger than that lucerne, the mixture must be in proportion.

Manure....Any kind of well-rotted dung, or pulverized gypsum, will increase the crops, though it may do without. When it is three or four years old, a good harrow-scratching cannot fail to be of service.

Produce....It will be, according to the soil, commonly two crops. The first richer than that of any other grass: The second less, in the proportion of one to nine; because you cannot mow the sainfoin as early as you do lucerne. If you wish to make a strong food for your horses, you must wait till it is grown up in seed for the first crop.

Mowing....I would recommend the method pointed out for lucerne, as the most profitable.

Longevity....Sainfoin is in full strength the third year, and will last from nine to twelve years, sometimes more, according to the soil and exposure.

Disorder....It is not liable to be destroyed by any kind of insect, as far as I know from an experience of fifteen years. Its mortal enemy is a flock of sheep, particularly when it is young.

Esparcet....This grass, unknown I believe in England, may be classed among the plants of perennial kind, and more like the sainfoin than any other. It has some peculiar advantages. It may be sown in every month of the year, except in time of snow or frost, growing upon every soil; it roots very well through stiff clay, stony or hard red gravel, provided

the ground has been ploughed as deep as possible.

Manure. The same as for sainfoin.

Produce, Mowing, &c. Though it would afford a crop nearly like that of sainfoin, I preferred keeping it for constant pasture; and in that way I have seen one of twenty-three years old, producing as fine grass as any young meadow. It is remarkable for keeping up the ground upon declivities. No disorder.

PIMPERNEL. This perennial plant, which I would rather call immortal, on account of its long continuance, highly deserves to be introduced into this country. It is capable of withstanding the severest cold, as well as heat; besides it grows as well upon the tops of mountains as in plains and vallies: it delights above all in light, gravelly or calcareous soils. This vivacious plant has the power of destroying every other kind of grass or weeds. It keeps green all the winter, and the cattle are so fond of it, that whenever they smell it, they soon remove the snow to get at it. Whether eaten dry, green, or wet, it never hurts the cattle: Its nutritive qualities differ from those of other plants of the same class; for instead of heating, it refreshes. Give me leave to submit to you a single instance, recommending this plant better than any other description.

In the province of Berri it was known long ago, that all the sheep who fed upon certain meadows full of wild pimpernel, had finer wool. In consequence, a gentleman of my acquaintance took the trouble to cultivate a piece of ground with that pimpernel, and his success has confirmed beyond any doubt our preceding remark. He bought twenty poor wretched sheep, who never had before but coarse and common wool. In the course of the first year the alteration in the wool was sensible, and the little flock was bearing a good and healthy appearance. Not farther than at the third shearing, the wool was so fine that it fetched one-fifth above the common price.

In short, this plant, whether as hay or in grass, affords the most relishing food to horses and cows; these last give much better milk.

Tillage and Sowing. The ground must be well ploughed at least six inches deep, once in the latter end of September, the second time in October. Then twelve pounds of seed will do for an acre, if the ground is good: Add to it as much sand or ashes, and sow it as you do lucerne.

Manure. It may do without; but gypsum and any kind of dung would increase the crops.

Like lucerne, this grass will receive a great benefit, by being scratched with a harrow, every other year in the beginning of March.

Produce. Commonly three crops, like lucerne, if it is reserved for hay. Is also mowed like lucerne, and perennial."]

Those of our readers who wish to acquire more minute information respecting the [English] native grasses, we refer to Mr. SWAYNE's excellent Treatise, entitled, "*Specimens of Pasture Grasses*;" (folio, 1*l.* 1*s.*), a work replete with information.

GRASS PLOTS and WALKS, are chiefly formed by covering spots of ground with turf taken from a fine common or down; as this

mode of obtaining verdure is more speedy, and, for durability, far preferable to that of sowing the soil with grass-seeds. But, where the latter method is practised, the seeds ought to be procured from those pastures which abound with fine and clear grass. The soil should be previously dug, and carefully divested of all clods and stones: after which it ought to be covered an inch deep with good mould. The seed is then to be thickly sown, and raked over, to prevent it from being dispersed by the wind. It will, however, be advisable to mix with the seeds a considerable portion of white clover, as this will produce a finer surface, and retain its verdure much longer than any common grass.

The turf intended to be laid in gardens, ought to be selected from such commons as are free from weeds; and, if it is to be transposed to a rich soil, it will be requisite to cover its surface beneath the turf, with sand, or an indifferent mould, that the grass may not become too rank. It will also be necessary to dress the turf late in autumn every second year, either with ashes, or tan, so that the rains may precipitate the ameliorating particles into the ground. The grass, when a few inches high, should be mowed closely, or grazed off by sheep, to prevent it from vegetating too luxuriantly; by which means it will retain its beauty for many seasons; but, if neglected, it will in a few years be overgrown with weeds.

GRASS-HOPPERS, or *Tettigoniæ*, L. are a family of insects belonging to the genus of *Gryllus*, and comprising 69 species: they all leap by the help of their hind legs, which are strong and much longer than the fore legs. Though their walk is heavy, they fly occasionally with great speed: the females deposit several hundred eggs in clusters under ground, by means of two *laminæ* or plates appended to their tail, with which they penetrate the surface. The larvæ that arise from them, resemble nearly the perfect insects, but are of a smaller size, and apparently destitute of wings: these, however, are enveloped in four excrescences or knobs, which are unfolded when the insect attains its full growth, after having four times changed its coat during the summer.

Grass-hoppers do not abound in Britain, and indeed are seldom seen in any considerable numbers, on account of our variable climate. But, in the warmer countries of Asia, Africa, and Europe, especially in Spain, they commit incalculable damage, by destroying the whole vegetation of a corn-field, in a short period of time. The only method of extirpating these predatory vermin, hitherto known, is to destroy their eggs wherever they can be discovered in the ground, either in early spring or late autumn; for, as they multiply rapidly, the extermination of the winged insects alone would not be attended with the desired effect.... For this purpose, ditches two or three feet deep, may be formed in autumn, filled with horse-dung, to which they are extremely partial, and the surface covered with a few inches of mould. In the following spring, numerous families of grass-hoppers, with their eggs, will be found assembled in these ditches, where they may be readily destroyed. See also LOCUST.

GRASSWRACK, or *Zostera*, L. a perennial native plant, of two species, the principal of which is the

marina, or Sea-grasswrack, found on sea-shores, and in salt water ditches near Yarmouth.

This vegetable grows at the bottom of the ocean, as common as the mosses thrive in woods: it is thrown on shore by the tide in such abundance, that mounds or dams, are constructed with its assistance, to prevent the encroachment of the sea. The green leaves are said to be an useful and durable substitute for thatch: when exposed to the air and weather, they become white. The inhabitants of Gothland, employ the grasswrack as an excellent manure, and likewise for stuffing their beds, as it is softer than hay or straw.... Horses and swine eat this herb, but it is not relished by cows, unless mixed with hay. The ashes obtained from the whole plant are, with great advantage, employed by Germans, in the manufacture of glass.

GRATES for FIRES, are composed of ribs of iron, placed at small distances from each other, so that the air may pass through the fuel, and the accumulation of ashes be, as much as possible, prevented.

Grates are peculiarly adapted to the use of pit-coal, which requires a greater draught of air to promote its burning freely, than any other kind of fuel.

In the year 1791, a patent was granted to Mr. BENJAMIN CHARLES COLLINS, of Salisbury, Wilts, for a grate on a new construction, to be used either in or out of a chimney. This invention is said to be calculated to increase the action of the air upon fire, by augmenting and directing the passage of the former through the latter. Thus the fire may be rendered so intense as to present a perfect white heat; and, as the draught of air is very great, the patentee observes, that "all, or nearly all of the unignited smoke is carried down into the fire and there consumed, instead of passing off in the common way." To effect this purpose, he constructs one or more air-flues provided with stops, by which he may at pleasure promote the draught of air to the requisite degree of heat.

Grates of this construction are asserted to be very useful for light-houses, and other places requiring a strong fire, such as laboratories, brew-houses, smelting furnaces, glass houses, &c. For a more circumstantial account of this patent, we must refer the reader to the 8th vol. of the *Repertory of Arts and Manufactures*...[See *Fireplace*.]

GRAVEL, in agriculture and gardening, is a congeries of pebbles; which, if mixed with stiff loam, make excellent and durable gravel walks. For this purpose, the bottom should be laid with lime rubbish, large flints, or any other hard substance, to the depth of six or eight inches, in order to prevent any weeds from shooting through the surface. Over this stratum, the gravel is to be strewed six or eight inches thick, and somewhat sloping, that all the larger stones may roll off to the sides. The next operation is that of raking, when the large stones are to be removed, and the walks carefully rolled in every direction, especially during or after hard showers: thus they will *bind*, and become very firm.

The most proper gravel for walks, is that which abounds with smooth round pebbles; for these, when mixed with a small portion of loam, are not so liable to be turned up by the feet in walking as those of a rough and irregular shape

Gravelly Lands or Soils are such as abound with gravel or sand, which easily admit both heat and moisture. They receive but little benefit from the latter, if there be a loose bed at the bottom, because it easily evaporates; but if the stratum be firm, for instance, clay or stone, the moisture is too long retained, so as to chill the soil and render it unfruitful. The best method of counteracting this inconvenience, is to manure such land with chalk, which is slightly to be ploughed in, that it may not sink too deep into the ground.

As gravel constitute the chief material of our roads, and thus becomes an article of considerable importance, we shall briefly mention a method, by which gravel or stone may be discovered *without boring*. It simply consists in observing, whether the common White Saxifrage, or *Saxifraga granulata*, L. (which see) grows on any spot where a bed of gravel is suspected to lie: for, if that plant be discovered, it will serve as a guide to surveyors or others, where to dig with a certainty of finding the object of their search. We state this fact on the authority of Mr. T. Walford, in the 25th vol. of *Annals of Agriculture*, where an accurate representation of the Saxifrage is given. For a method of clearing land from stone or gravel, we refer the reader to the article Stone.

GRAVEL, in medicine, is a disorder affecting chiefly the bladder and ureters; it is occasioned by a sandy or gritty substance which collects in those parts, produces considerable pain, and at length obstructs the due secretion and excretion of the urine.

Although the gravel is generally considered as the forerunner of the *calculus*, or stone, yet we are convinced from experience, that they are distinct diseases; and that those patients who are afflicted with the former, are generally exempt from the dangers of the latter.

Persons of a gouty or rheumatic habit, as well as the aged, often discharge a white-reddish gravel, which not only obstructs and suppresses the emission of urine, but by its stimulus occasions colic, vomiting, and other spasms. There is a peculiar bodily disposition required for the generation of this painful disease; but it is also remarkably promoted by the use of sour wines; hard food, or such as is with difficulty digested, especially *cheese*; a sedentary life, &c.... For the cure of the gravel, only the mildest diuretics (which see) ought to be resorted to; perspiration should be supported by gentle means, particularly by friction with warm flannel; moderate exercise is never to be neglected; and the patient's diet, as well as his mode of living in general must be regulated by appropriate temperance, and abstinence from all heating food and drink.

[A very common plant about Philadelphia, viz. *Erigeron Philadelphicum*, *fleabane*, or *Cavender*, has been frequently given with evident relief in this distressing complaint. Half a pint of a moderately strong infusion of the plant in water, twice a day, is the dose.]

GRAVELLING, a disorder incident to horses much employed in travelling. It is occasioned by small particles of gravel penetrating between the hoof and shoe, in consequence of which the part swells and festers.

The most efficacious remedy, we understand, is to remove the shoe as early as possible; to *draw*

the place to the quick; to express the matter and blood gathered there, and to pick out all the gravel. The wounded foot is next to be washed with copperas-water; then to be filled up with a mixture of hot grease and turpentine; the hole stopped with the refuse of flax or hemp, and the shoe properly set on again. Meanwhile, the animal should not be suffered to work or travel, and the foot must be kept dry: thus, it is asserted, it will heal after two or three dressings.

GRAVE, See BURIAL, BURYING-GROUNDS, and FUNERAL RITES.

GREASE, a disorder in the heels of horses, proceeding either from a relaxation of the vessels, or a vitiated state of the blood and humours.

When a horse's heels are first observed to swell in the stable, and to subside on taking exercise, care must be taken to wash them very clean, after every journey with soap-suds, urine, or a mixture of vinegar and water. Thus, with proper rubbing, the disease will often be effectually prevented, or removed. Or, the heels should be well bathed twice a day either with old verjuice, or the following mixture, which is well calculated to brace the relaxed vessels: Take of rectified spirit of wine 4 oz. dissolve in it ½ oz. of camphor; then add 6 oz. of wine-vinegar or verjuice, and 1 oz. of white vitriol dissolved in a gill of water. After mixing these ingredients, cloths dipped in the linament should be applied to the heels of the animal, and fastened with a proper bandage for a few days, during which the cure will generally be performed. A laced stocking, made of strong canvas, or coarse cloth, neatly fitted to the part affected, will afterwards be found very useful, and might be easily contrived.

But, if cracks or scratches are perceptible, which suppurate, the hair should be carefully clipped away, as well to prevent a gathering, as to admit of cleansing the animal's heels from all impurities, which would tend considerably to aggravate the disorder. Should this be the case, or if the heels be covered with hard scabs, it will be requisite to begin the cure with poultices, prepared either of boiled turnips and lard, with a handful of bruised linseed, or oatmeal and rye flour, with a little common turpentine and hog's-lard, boiled up with strong-beer grounds, or red-wine lees. Beside applying either of these poultices for two or three days, the sore parts ought at the same time to be dressed with the digestive ointment, in order to soften them, promote a discharge, and reduce the swelling; when sores may be dried up with the following absorbent: Take white vitriol and burnt alum, of each 2 oz. *Mel Ægyptiacum* (see FRUSH) 1 oz.; and lime-water two or three pints; wash the sores three times a day, with a sponge dipped in this mixture: and apply the common white ointment spread on tow, adding previously two drams of sugar of lead to one ounce of this salve.

When the distemper is only local, and requires no internal medicines, the method above described is generally successful; but if the horse be full and gross, his legs much gorged, so that the hair stares up, and is, as farriers term it, *pen-feathered*, discharging a fe-

tid matter from deep foul sores, in such case it will be advisable to apply to a skilful veterinary surgeon; as the disorder is then become of a dangerous tendency.

GREASE, the fat of animals, or any unctuous matter. See FAT, and TALLOW.

Having already given some recipes for removing grease spots from CLOTH, we shall here add a few directions for discharging them from *Leather*, or other articles of wearing apparel: Take equal quantities of soft soap, and the ashes of vines; let them be well mixed together, and a small proportion of tartar and burnt roach alum be added; these articles should be thoroughly incorporated, then formed into balls, and kept in a dry place for occasional use. With such balls the spots are to be carefully rubbed, in consequence of which, it is affirmed, they will totally disappear.

Another, and more simple method, however, is to rub the leather with the white of an egg, which, when dried in the sun, will leave no trace of the spot or stain.

[Mr. HENRY, in his late excellent *Epitome of Chemistry*, says that "spots of grease may be removed by a diluted solution of pure pot-ash; but this must be cautiously applied, to prevent injury to the cloth. Stains of white wax, which sometimes fall upon the clothes from wax candles, are removed by spirit of turpentine, or sulphuric æther. The marks of white paint may also be discharged by the last mentioned agent."]

GREEN, is one of the primary colours, exhibited by the refraction of the rays of light. See COLOUR.

Sap-Green is a simple colour, but far inferior to verdigrease; it is prepared from the juice of buckthorn berries, evaporated to the consistence of a gum: but it frequently inclines to a yellowish colour.

Another green sometimes used is called *terra verte*, which is a native earth, probably impregnated with copper. It is of a blueish-green cast, much resembles what is called *sea-green*, but is gritty, and requires to be finely levigated before it is used. Its colour is durable, but not remarkably bright. See also GREEN.

A *durable green pigment* has long been a desideratum among painters. M. KINNMAN, a member of the *Swedish Academy*, has, at length, discovered and published the following process: Dissolve, in separate vessels, a portion of zinc in aqua-fortis, and cobalt strongly calcined, in aqua regia, till the liquors are completely saturated. When both solutions are prepared, mix *two* parts of the latter with *one* part of the former; then procure a hot and clarified solution of potash, *three* parts of which will be required to precipitate the mixture above specified. After it has subsided, the fluid part should be decanted, and the sediment evaporated to dryness over the fire, till it assumes a green colour. Before, however, this pigment can be used, it ought to be repeatedly washed with filtered water: thus it will become fit both for oil and water-colours, as it is sufficiently fixed to withstand the effects of the air and sun; for the inventor has ascertained its superior durability by more than ten years' experience. He adds, that painters may, by means of this preparation, combine their yellow and ultramarine, so as to form a very beautiful and permanent green.

Green....The following method of preparing *Brunswick Green*, a beautiful colour, in great request on the Continent, for oil-painting, and in the manufacture of stained paper, is inserted on the authority of M. Kasteleyn. He directs shavings of copper to be put into a close vessel, and sprinkled with a solution of sal ammoniac. The metal first unites with the muriatic acid, and is dissolved, when it is precipitated by the disengaged ammonia, with which it combines..... The precipitate is then to be washed, and dried either in wooden boxes, or upon an expanded cloth: the liquid now remaining may be repeatedly employed as a solvent for fresh portions of sal ammoniac, till it be completely saturated. M. Kasteleyn states, that three parts of such salt are sufficient for two parts of copper, and that the result will be six parts of colour. This beautiful pigment is sold in Holland by the name of *Friesland Green*; and it sometimes forms an article of exportation: in which case it is generally adulterated with white lead.

[To paint a good green, the first coat must be a lead colour.]

GREEN-FINCH, a species of the *Fringilla*, L. a charming little bird, which has a strong tinge of green diffused over its whole body, the wings and tail are black, but variegated with yellow.

The green-finch may be easily domesticated, by carrying it into a dark place, putting it upon one finger and gently touching its breast with a finger of the other hand. Thus, by a few caresses, and gradually admitting day-light, this little creature may be accustomed to eat any bruised seed out of the hand, and will then continue tame. With respect to the proper food for green-finches, and their treatment when in a diseased state, we refer to the article Gold-finch.

GREEN-HOUSE, a conservatory or erection in gardens, for the purpose of sheltering the more curious and tender exotics from the effects of our variable climate, especially during the winter season.

The length of green-houses ought to be proportioned to the number of plants intended to be kept, or raised. Their depth in small houses should not exceed twelve or fourteen, and in large ones, eighteen or twenty feet. The windows should reach from about $1\frac{1}{2}$ foot above the pavement to nearly the same distance from the ceiling, so as to admit of a cornice being constructed round the buildings, over the tops of the windows. The breadth in the smaller conservatories ought not to be more than 5 or $5\frac{1}{2}$, and in the larger ones 7 or $7\frac{1}{2}$ feet; as they will otherwise become heavy and inconvenient.

The floor ought to be paved with Purbeck-stone, or flat tiles, elevated two, or if the situation be damp, three feet above the surface of the ground; it will also be advisable to carry a flue, about ten inches wide, and two feet deep, beneath the floor, through the whole length of the house, and to return it along the back part, where it should be carried up into funnels, for the purpose of discharging the smoke. In the inside, shutters should be made so as to fold back upon the piers, that the rays of the sun be not impeded. The inner wall of the building ought to be either covered with stucco, or plastered with mortar, in order to exclude the frosty air. But, if the walls be wainscoted, it will be requisite to

plaster the intermediate space with lime and hair: the cieling and walls or wainscot ought, however, to be white-washed, so that the rays of the sun may be reflected throughout the building.

While the front of the conservatory is placed directly south, the two wings should be respectively arranged to face the south-east and south-west. Thus, the warmth of the sun will be reflected from one part of the green-house to the other, during the whole of the day; and the front will be effectually guarded against the cold northerly winds.

In the 2d vol. of "*Recreations in Agriculture*," Dr. ANDERSON proposes to construct a green-house, in such a manner that it may be converted into a hot-house, without requiring any additional fuel. He therefore recommends the roof to be made of glass, placed in a sloping direction; and to fix perpendicular windows on the top of the front wall, so as to raise the lower eaves of such roof considerably higher than that of the slates would have been, without elevating the middle of the roof. According to his plan, the triangular, perpendicular wall should be completely covered with glass, through which the morning and evening sun may be admitted. In the country, or in houses unconnected with others, he suggests the propriety of bringing perpendicular windows closely down to the floor, both on the east and west ends, in order to receive the benefit of the rising and setting sun.

With respect to the conversion of this structure into a *stove*, or *hot-house*, Dr. ANDERSON supposes it to be erected close to the kitchen chimney of an inhabited house.... At a small distance from the bottom of the chimney, there is to be made a communication with a flue, or stove, which passes beneath, and rises on the opposite side of the green-house, where an appropriate tile is suspended from a lever which, by means of a cord fastened to its extremity, may at pleasure drop this cover on the top of the tube or flue, and thus prevent the smoke from ascending; the bottom of the cover being lined with pieces of thick cloth, so that it may apply closely and become air-tight. A valve is likewise placed in the chimney, which turns on a pivot, so as either to allow the smoke a free passage, or to impel it into the flue, whence, after parting with its heat, it is either suffered to escape at the top, or is reverberated, according as the covering tile before alluded to, is shut or opened.

For a more ample account of this project, we refer the reader to 2d vol. of Dr. ANDERSON's instructive work above cited, where it is illustrated by cuts. We have here given an outline of his plan, because it is ingenious, and may lead to farther improvements.

With respect to the management of plants in green-houses, MORTIMER recommends occasionally to open the mould in which they are set, to scatter a little fresh earth on the pots, and over this to lay a little dung. It will also be advisable to water them, when the leaves begin to curl or wither; and to pluck off such as are decayed; but these operations should not be too frequently repeated. See HOT-HOUSE.

[Plants destined for the Green-house, should be kept out as late in the autumn as safety will admit, in

order to prepare them for the diminished temperature to which they will be exposed. A slight white frost will not injure, but benefit all except *very tender* plants. During the day they ought to be placed in the shade for a week, in order that they may not suffer by different degrees of temperature in the day and night; and that they may be accommodated gradually to the cold, which they are destined to bear, before being confined for the winter.

The sun must be kept out until the depth of winter....In the evening, water the floor, in order that the air may be filled with moisture, by which plants thrive more than when the water is applied to their roots.

Orange, lemon and lime trees, must not be permitted to blossom in the green house during winter, as they will thereby be prevented from bearing the following season. They must only be kept alive and healthy, to prepare them for the genial warmth of the external atmosphere in the spring.....The leaves are much disposed to fall off, if the tree has been subjected to too much warmth during the winter.....The ever-green plants never push out leaves in the same place a second time. Water constantly evaporated from a stove, is higly useful.

J. W. Watkins, Esq. of New-York, gives the following plan for the construction of a green-house, in the *Trans. of the Agric. Soc.* of the above state.

The building should be sunk in the earth from two to four feet, in proportion to the size of the house, and according to the nature of the soil; as clay retains moisture, and of consequence produces damps, in such ground it should not be so deep. The height should not exceed twelve feet from the exterior ground, by which it will be less exposed to high winds. The width should not exceed sixteen or eighteen feet, as the sun's rays are at that distance from the glass very feeble. A south front is well known to be the true one, but advantage should be taken of glazing as much of the eastern end as possible, for the benefit of the morning sun. The front should decline northward from a perpendicular with the horizon, so as the angle made thereby with the horizon, will at noon day in winter, bring the rays of the sun to strike the glass at right angles, and the roof should descend the opposite side without a break. By this position of the roof and glass, the rays of the sun are thrown upon every part of the inside of the house, and the whole becomes heated thereby; more of the rays are also introduced into the building, and when the sun produces most heat during the day, there is no reflection of its rays, and at other parts of the day, the reflecting angle being obtuse, does not powerfully cast off the rays. The inside of the rafters of the roof, should be lined with boards, and the space between that and the roof filled with a mixture of straw, sand, and clay made into mortar; boards should be used in preference to shingles, as making fewer breaks in the roof, less opportunity is given for the admission of cold air. The residue of the building may be of stone or brick work, or a frame building filled in with bricks, and no flooring of any kind upon the ground. Shutters on the outside are sufficient, and it is prefer-

able to have them hung on hinges, as the least troublesome, to the common practice of sliding ones; they should be made to fold into the spaces between the windows.

Before putting the plants into the house, the bottom should be covered with bark from a tan-vat, about a foot deep, according to the depth the building is sunk in the earth.

The advantages proposed by this method of constructing are, the lessening the expense of building, that the heat of the sun being sufficient to warm the house, the trouble and expense of warming it by a stove is avoided, which unless very carefully attended, the plants may be injured by too much heat, and are always by the smoke that unavoidably makes its way out of the pipes. It would be proper, nevertheless, to make arrangements in constructing the house for using a stove, in case a long succession of cold cloudy days, by obscuring the sun, should reduce the heat in the house below that degree of temperature necessary for preserving the plants, which is a case that will seldom happen, as one clear day will warm the house sufficiently to admit its being shut up for several days.

Plants in a house of this kind require less water, and do not suffer for the want of atmospheric air. It is probable, as the earth is charged with electric fluids, as vegetable substances are known conductors of it, that the bark, by its fermentation, not only generates heat, but serves as a mean to produce out of the earth, an atmosphere for the plants, sufficient with such atmospheric air as will find admission, to supply the quantity exhausted, by the daily rarefaction occasioned by the sun's heat.

A green-house has been [illegible] upon this construction in this state, without having had the least occasion of being heated by fire. The plants in the spring were remarkably thrifty; tropical fruit ripened in it during the winter, and young fruit formed on the trees. It required no other care, than now and then watering the plants, and shutting the windows as soon as the sun left them.]

GREEN-SICKNESS. See *Chlorosis*.

GREY-HOUND, the Common, or *Canis Graius*, L. is a dog remarkable for his swiftness, strength, and sagacity, in pursuing game.... There are several varieties, such as the Italian, the Oriental, and the Highland Greyhound: the last of which is now become exceedingly scarce.

A good grey-hound ought to have a long, and rather large body; a neat pointed head, sparkling eyes, a long mouth, with sharp teeth, small ears, formed of a thin cartilage; a broad, and strong breast; his fore-legs straight and short; his hind-legs long and limber; broad shoulders, round ribs, muscular buttocks, but not fat, and a long tail, strong and full of sinews.

In the breeding of these animals, the female is principally to be regarded; though both should, as nearly as possible, be of the same age, which ought not to exceed four years.

The food of grey-hounds ought to consist of chippings, or raspings of bread, with soft bones and gristles; these should always be soaked in beef or mutton broth, and,

when nearly cold, some milk may be added. On this diet, they should be fed morning and evening, which will greatly contribute to preserve them in health and spirits. But, if nevertheless, the dog should become sick or weakly, we understand that a rich broth, prepared by boiling a sheep's head together with the wool, in a sufficient quantity of water, with the addition of some oatmeal, and given to the animal alternately with the flesh, will speedily promote his recovery.

The proper exercise for a greyhound is coursing three times a week; and, if he be consequently rewarded with blood, it will animate and encourage him to pursue game. After the chase, he should be led home, his legs washed with beer and butter, and in about an hour, he may be fed.

GRIEF, or an increased and continued degree of sorrow, is one of the depressing passions. Its influence on the body is remarkable; and its effects with few exceptions, are similar to those of *fear*.

Grief diminishes bodily strength in general, and the action of the heart in particular. The circulation of the fluids is thus impeded, the bile stagnates, and occasions indurations of the liver; or, by mixing with the blood, it produces either jaundice or dropsy. Grief also diminishes perspiration, renders the skin sallow, aggravates the scurvy, but particularly putrid fevers, and disposes persons to become easily infected with them. Its effects in changing the colour of the hair, are well known, and instances have occurred, in which the hair has been turned from a deep black to a grey colour, in 24 hours. Blindness, gangrene, and even sudden death, or, as it is emphatically called, a *broken heart*, have resulted from the excess of this passion. Persons who indulge in *fretting*, become at length in a high degree peevish and irritable: from the constant return of sorrow, the mind beholds new food for it in every object. Thus, the whole imagination is seriously affected, and the most profound melancholy, together with a nervous fever, or, which is still more dreadful, with total insanity, are the inevitable consequences.

Consolatory arguments being the first remedy that can be administered, recourse should be had to whatever is chearful, or calculated to dispel thought, and to divert the mind from brooding over its real or imaginary woes. Gentle opiates, cautiously taken, may occasionally be of great service in this preying disease; but daily exercise in the open air, must on no account be neglected; the body should be frequently rubbed with dry cloths, and perfumed with vinegar, amber, or other fragrant matters: the tepid bath will also be found of eminent advantage; and, if possible, the patient ought to be removed to a more genial climate. Mild wines, if drank with moderation, will be often productive of the happiest effects; but, if they be intemperately used, their strong tendency to generate an acid, cannot fail to deprave the appetite, and disorder the stomach.

GRIPES, or COLIC, in Farriery, a disorder with which horses are frequently affected. As it arises from various causes, its treatment must necessarily differ; and as the most judicious farriers have divided this malady into three species, we

have adopted such divisions, because there is no distemper incident to that useful animal, which is more frequently mismanaged by ignorant pretenders, and consequently becomes incurable.

The first species is the *flatulent* colic, which is generally occasioned by wind in the bowels, after drinking cold water, when the horse is hot; or the perspirable matter is retained, and repelled on the bowels by catching cold; in either case, those parts become violently distended. This species of the disease may be distinguished by the rumbling of confined air in the intestines, and the restlessness of the animal affected, which often lies down, and rises almost instantly with a violent spring; striking his belly with his hinder feet, stamping with those before, and refusing his food. The horse is frequently attacked with a kind of convulsions, and falls into profuse sweats, which are quickly succeeded by cold damps. He strives repeatedly to stale, turning his head to his flanks, rolling on the ground, and frequently lying on his back. The symptom last mentioned arises from a retention of urine, which generally attends the flatulent colic, and is often increased by an accumulation of dung pressing on the neck of the bladder. The first remedy is, to introduce into the straight gut, a small hand dipped in oil, by which the confined air obtains a passage; and the neck of the bladder being thus relieved, the suppression of urine will be removed. Next, the following preparation will be of considerable service: Take half an ounce of Venice turpentine, and a similar quantity of juniper-berries pounded; one ounce of salt-petre, one dram of oil of juniper, and two drams of salt of tartar. Let these ingredients be formed into a ball with syrup, and given to the animal affected; after which it may be washed down with a decoction of juniper-berries, or with a little ale. But, if the horse neither break wind, nor stale plentifully, it will be requisite to repeat the ball at the expiration of two hours, with the addition of one dram of salt of amber. He should likewise be gently exercised during the continuance of the fit. A clyster may be given either during the interval of taking the balls, or alone, and occasionally repeated: for this purpose farriers use the following ingredients, viz. Two handfuls of chamomile flowers, an ounce of anise-seeds, and a similar quantity of fennel and coriander seeds: these are to be boiled in three quarts of water, till they are reduced to two; when half a pint of gin should be added together with half an ounce of oil of amber, and eight ounces of oil of chamomile. We conceive, however, that instead of the last three expensive articles, a pint of common, or linseed oil, will answer a similar purpose. By a judicious application of these remedies, the animal will be considerably relieved; and, if his restlessness cease, and he continue quiet for an hour or longer, no danger need be apprehended.

2. The *bilious*, or *inflammatory* gripes, are attended with the same symptoms as the flatulent colic, together with a considerable degree of fever, panting, and dryness of the mouth. The horse frequently discharges a small quantity of dung, together with a hot scalding water. If the urine appear of a blackish, or reddish colour, accompanied with

a fetid smell, a mortification will speedily ensue. To counteract these dangerous symptoms, the distempered animal should immediately lose three quarts of blood; which operation ought to be repeated, unless a favourable change take place within three hours. The clyster above-mentioned, should be injected thrice a day, with the addition of two ounces of nitre dissolved in water: large draughts of gum-water should be allowed, and a pint of the following drink administered every three hours, till several loose stools are procured; when it may be repeated every night and morning, till the disorder be removed: Let three ounces of senna, and half an ounce of salt of tartar be infused in two quarts of boiling water, for one or two hours; when the liquor should be strained, adding two ounces of the common lenitive electuary, and four ounces of Glauber's salt. If, notwithstanding these remedies, the inflammatory symptoms become more violent, the event will in general be fatal. A strong decoction of Peruvian bark is the only medicine that may probably afford relief; a pint of which ought to be given every three hours, with half a pint of port wine.

3. The *dry gripes* arise chiefly from costiveness; they are known by the animal's restlessness, and frequent but unsuccessful attempts to dung. In this case, the straight gut should be relieved in the manner above directed for the flatulent colic; an emollient clyster, consisting of two or three quarts of thin water gruel, six ounces of sugar, and an equal quantity of salad-oil, should be injected lukewarm, three times in the course of twenty-four hours; and the purging drink, prescribed for the inflammatory gripes, may be given till the bowels be unloaded, and the symptoms abate.

The proper diet for horses attacked with either species of this painful disorder, ought to be scalded bran, thin water-gruel, or what is called by farriers *white water*; which is prepared by dissolving four ounces of gum arabic in two quarts of water, and mixing the whole with the animal's usual drink.

GROMWELL, or *Lithospermum*, L. a genus of perennial plants, comprising several species, the principal of which are;

1. The *officinale* Common Gromwell, or Gromill, Gray-mill, or Gray-millet, which grows in dry gravelly soils, and flowers in the months of May and June. The seed of this plant affords excellent flour, which might in times of scarcity be converted into bread. From the rind of the root, a red colour may be extracted; and it is also employed in the North of Europe as an inoffensive paint for the face, especially by country girls. Its seeds were formerly medicinal, but possess no peculiar properties; though HALLER observes that the plant itself is narcotic.

2. The *arvense*, Corn, or Bastard Gromwell, Gromil, or Alkanet; a noxious weed, which is common in corn-fields, and flowers also in May and June. The juice of the root is likewise used as a paint: its rind tinges wax and oil of a fine red colour, similar to that which is obtained from the root of the foreign Alkanet. Sheep and goats eat the Bastard Gromwell, but cows do not relish it; and it is totally refused by hogs and horses.

GROUND-IVY, GILL, or ALEHOOF, *Glechoma Hederacea*, L. an indigenous plant, thriving in groves

hedges, and shady places; flowering in the months of April and May.

Ground-ivy has a peculiar strong odour; it is of a bitter and slightly aromatic taste. Its leaves contain an essential oil, destitute of smell. This plant was formerly held in great estimation, and supposed to possess eminent medicinal virtues; but which are not confirmed by later experience. In obstinate coughs, it is still a favourite remedy with the poor, who probably experience its good effects by persevering in its use, and abstaining from animal food.

The expressed juice mixed with a little wine, and applied morning and evening, is said to destroy the white specks sometimes occurring on the eyes of horses.

It is observable, that plants growing near the ground-ivy, do not prosper; and that this vegetable proves hurtful to horses, if they eat it in any quantity; nor should it be given to diseased sheep, though it is a grateful and salutary food to them, when in health. But horses are not very partial to it; and it is totally refused by cows, hogs, and goats.

GROUND-NUTS, or GROUND-PEASE, the *Arrachis Hypogaios Americanus* of RAY, a plant cultivated in the West-Indies by the Negroes. When in flower, it inclines towards the earth, into which the pointal enters, and extends to a certain depth, where the seed-vessel and fruit are formed; so that the latter attains to maturity under ground. As large crops of this vegetable are produced on light sandy lands, of little value, it may perhaps be advantageously cultivated in the southern counties of Britain.

The seeds or fruit, when bruised and expressed through canvass bags, afford a pure, clear, and savory oil, which, in the opinion of Dr. WATSON, may be used for the same purpose, both culinary and medicinal, as those obtained from olives or almonds. The oil of ground-nuts, however, possesses a great advantage, as it will admit of being kept for a considerable time, without becoming rancid, or requiring any particular care, even during the heat of summer. As one bushel of the seeds, when expressed, yields a gallon of pure oil without, and a much larger quantity, though of inferior quality, with the aid of heat, they deserve to be more generally known and imported. The value of a bushel of these nuts, in South Carolina, did not exceed eight pence in the year 1768, when specimens of the seeds were produced before the *Royal Society*, and an account given in the 59th vol. of their *Philosophical Transactions* for 1769.....[See EARTH-NUTS.]

GROUND - PINE, or *Ajuga Chamoepitys*, L. an indigenous plant growing in sandy fallows, and flowering in the months of April and June. It possesses a bitter and acrimonious taste, and though it has often been recommended as a medicine for the cure of the gout, jaundice, and intermitting fevers, yet its real efficacy in these diseases is not ascertained.

GROUNDSEL, the COMMON, or *Senecio vulgaris*, L. an indigenous plant, growing on cultivated grounds, rubbish, and in court-yards; it flowers from April to September. A strong infusion of this weed exites vomiting; the bruised leaves afford a refrigerant and healing application to boils.... Its seeds are very agreeable to

gold-finches and linnets confined in cages. Cows do not relish this plant: it is, however, eaten by goats and swine, but refused by horses and sheep.

There is another useful species of the groundsel, the *Senecio Jacobœa*; for which we refer to RAGWORT.

GROUSE, or GROWSE, *Tetrao tetrix*, L. a native bird, which is found in woody and mountainous situations, chiefly in North Britain. The male is two feet in length, and weighs nearly four pounds; while the female is only about half that length and weight: she deposits six or seven eggs, which are hatched late in the summer; and the young birds subsist at first on ants' eggs, and wild mountain berries.

Towards autumn, grouse frequently descend from the mountains, and feed on corn: as they grow older, their principal food is derived from the tops of heath, and the cones of the pine-tree, by which they acquire a delicate flavour, and are speedily fattened. At present, these birds are rarely found in England, though *grouse-shooting* is a favourite sport in various parts of Scotland.

GROVE, in gardening, is a small wood impervious to the rays of the sun.

Groves constitute one of the chief ornaments of our gardens: they also afford the greatest relief against the scorching rays of the sun, while the rest of the garden is parched with heat; so that without a grove, every large garden must be defective.

Groves are either open or close. The former are composed of large shady trees, arranged at such distances as to prevent the rays of the sun from penetrating through their intertwining branches. Close groves frequently contain large trees; but the ground beneath is so thickly planted with shrubs as to form private walks, sheltered from the wind. These are often contrived, in order to bound the open groves, or to conceal the walls or other inclosures of the garden: and, when properly laid out, with dry walks winding through them, between fragrant shrubs and flowers apparently irregular, they have a most pleasing effect.

In the planting of groves, the trees should be placed at diagonal intervals, by which mode they will acquire a more noble appearance, and also form a shade much sooner than such as are planted in direct lines.

GRUB, in ZOOLOGY, the English name for worms, or maggots, hatched from the eggs of beetles.

Grubs are an excellent bait for many kinds of fish. In angling for the grayling (see UMBER) as well as trout, the *ash-grub* is preferable to all others. This insect is of a milk-white colour, a plump round form, with a red head. There is another very common grub, which is longer and thinner than the ash-grub; has also a red head, but two rows of legs along the belly; it is tougher and yellower. To preserve grubs, they should be kept in bran, which will render them very firm; but the ash-grub is always so tender, that it can with difficulty be employed as a bait: hence, it should be wrapped in a piece of stiff hair with the arming, and about a straw's breadth left to project at the head of the hook, to prevent the grub from sliding off, when baited. The horse-hair must be white, or of a colour perfectly resembling that of the

bait; as otherwise it will be suspected by the fish. For the different methods of destroying grubs, in general, see CHAFER.

GRUBBING, in agriculture, a term used by farmers to denote the extirpation of trees.

Old trees which are past growing should be taken up by the roots, and young ones planted in their stead. That is, in most places, a tedious operation, though in some counties a machine is employed for this purpose, which considerably facilitates the labour and lessens the expense of removing the roots. It consists of an iron hook, about two feet and a half long, with a large iron ring affixed to its handle. The ground about the root being cleared away, and the straggling horizontal roots cut off, the point of the hook is fastened to some part of the stump; and a long lever of sufficient strength, placed through the ring. Thus arranged, two men at the extremity of the lever force it in every direction, till the root is torn out, twisting off the tap-roots at some distance under ground.

This method appears to be very effectual in stubbing up the roots of underwood; but, when those of very large trees are to be extracted, it will be advisable previously to cleave them with wedges into several parts, and then to take them up separately. See also BERNE-MACHINE.

GUAIACUM, or *Lignum vitæ*, L. is a genus of plants producing three species, the principal of which is the *officinale*, or Common Lignum Vitæ, a native of the West Indies. It may, in colder climates, be propagated by seeds sown in pots plunged into a hot-bed, but it is seldom cultivated in this country.

The wood of this species is of equal utility in the mechanical arts, and in medicine; being so heavy as to sink when immersed in water. It is chiefly employed in the West Indies for the wheels and cogs of sugar mills, and is also frequently formed into mortars, bowls, and other utensils.

The wood, gum, and bark, are all employed in medicine, though the two first are chiefly used in Europe.

Gum Guaiacum is of a friable nature, of a deep greenish colour, but sometimes of a reddish hue; and has a pungent acrid taste..... There is another spontaneous exudation obtained from the bark of this tree, which is called *native gum*; it is imported in small irregular, semi-pellucid pieces; and is much purer than that extracted by incision.

The general virtues of Guaiacum are those of a warm aromatic medicine: it strengthens the stomach and other viscera, and greatly promotes the discharges of urine and perspiration. Hence it is of especial service in cutaneous eruptions, and disorders arising from obstructions of the excretory glands: in rheumatic and other pains, unattended with fever, the liberal use of gum guaiacum has often afforded considerable relief. It is likewise a good laxative, and furnishes a more active medicine than either the wood or bark of this tree.

Gum Guaiacum, when dissolved in rum, or combined with water, by means of mucilage or the yolk of an egg, or in the form of a tincture or elixir, has been found useful in chronic rheumatism, or even in such wandering pains of the sto-

mach or other parts of the body, as could be attributed to the retrocedent gout; in which cases a smalll table-spoonful of the emulsion may be taken three or four times a day.

GUDGEON, in Ichthyology, is a species of the *Barbus*, or BARBEL; which see. It inhabits most running waters, small streams, such as the river Lea, and is found in great abundance in the New-River, near London. Though small, this fish is highly esteemed for its fine flavour.

Gudgeons generally hide themselves under weeds, in rough water, and among the sedge growing at the sides of rivers, particularly during the spawning season, which commences about the middle of April, and terminates with the month of May. When full of spawn, they are of a superior flavour, and this period includes the latter part of March, and the first part of April.

The proper season for taking gudgeons is in the month of March, April, and May, but the rods, lines, baits, &c. differ in several material respects according to the particular time of the year fixed upon for angling. In general, however, the rods should be of a small size, and the line a single horse-hair, or that of a goat may be substituted. The hooks should also be very small, three or four of which must be affixed to each line, at the distance of six inches from each other; and the depths at which the sportsmen is to angle, vary, according to the season of the year, the nature of the water, and other circumstances. The most general bait for gudgeons are, blood-worms and white paste.

On taking his stand, the angler may throw in bread as a ground-bait; but the common method of disturbing the bed of the river with a rake, should be adopted only in warm seasons. Sometimes it is attended with good effects to *plumb* the bottom, or at least to drop the plummet rather deep. A curious double plugged float, and small shot, fixed at about three inches from the hook, is generally used with success in catching these fish.

GUELDER-ROSE, or *Viburnum*, L. a genus of plants comprising twenty-two species, two of which are natives of Britain.

1. The *Lantana*, Mealy Guelder-rose, Pliant Mealy Tree, or Wayfaring Tree, which grows in calcareous soils to the height of 18 or 20 feet, in woods and hedges: it produces large white flowers in May, and black farinaceous berries in October. The young branches and rind of the trunk of this species may be employed for bands and cords. It is, however, chiefly esteemed for its beautiful foliage, which renders it an ornament to parks and plantations. The bark of its root is used for the preparation of bird-lime; the berries attract birds, and are of a drying astringent nature.

3. The *Opulus*, Common Guelder-rose, or Water Elder, which grows in woods and damp hedges; bears white blossoms in May or June, and red berries in September. When in bloom, this tree exhibits a singularly fine appearance; the flowers, though small, are formed into large globular umbels, whence it is sometimes called the *Snow-ball tree*. Birds are enticed by the red berries, but will not eat them. According to BECHSTEIN,

these berries may be preserved in vinegar, and the tough, hard wood is employed by shoe-makers for small pegs of heels.

[GUILANDIA, *Bonduc* or *Nickar tree*. A forest tree abounding in the western states of America. It bears nuts about the size of the pignut, of a deep chocolate colour and shining appearance. The shell is so thick and hard, that they require to be filed, to forward their vegetation. The nuts when parched and ground, are substituted for coffee by the inhabitants of the western country.

GUINEA, a British gold coin, thus denominated, because the precious ore from which the first guineas were coined, was originally imported from the coast of Guinea.

The value or rate of this coin has frequently varied: when first struck, its current price was 20*s*. on account of the scarcity of gold, it afterwards advanced to 21*s*. and 6*d*. but its present nominal value is 21*s*.

If the pound weight (troy) of gold be divided into 89 parts, each of them will be equal to half a guinea, so that 12 ounces contain 44½ guineas. As this favourite coin is gradually disappearing, we think it superfluous to state its accurate proportion of pure gold and alloy: it has been confidently reported, that English guineas have lately been exchanged on the Continent, and especially in Hamburg, at from 24 to 25 shillings. Such temptations, however, will induce only those persons to profit by the opportunity, who are now almost exclusively in the possession of *gold*, while they accommodate us with *paper*.

GUINEA-CORN, or *Holcus Sorghum*, L. an exotic vegetable, growing on the coast of Africa: its stalks are large, compact, generally attaining the height of 7 or 8 feet, and producing abundance of grain. It may be easily raised in sheltered situations, especially in exhausted hot-beds and other loose soils, where its seeds should be sown early in the spring; as the large flowery tops appear in June. In Tuscany, Syria, and Palestine the flour made of this grain is mixed with other meal, and converted into bread; which however, is generally brown, tough, and heavy. Hence the former is better calculated for milk-porridge that is equally wholesome and nutritive. The juice exuding from the stalks of the Guinea-corn, is so agreeably luscious, that it affords excellent sugar, by a process similar to that adopted with the sugar-cane. The seeds furnish nourishing food to poultry and pigeons, as well as for horses and hogs. STRUVE, a German writer on economy, states, that he obtained from this grain good vinegar by fermentation; and, on distilling it, a strong spirit.

GUINEA-GRASS, a valuable species of herbage, thus denominated, as it was first discovered on the coast of Guinea, whence it was brought to Jamaica, and afterwards imported into this country.

In point of real utility, this plant ranks, in Jamaica, next the sugar-cane; for the breeding farms throughout the island were originally established, and are still supported, chiefly by means of the Guinea-grass, which bestows verdure and fertility on lands that would otherwise not deserve to be cultivated. About ten years since, it was also introduced into the East-Indies, where it is now suc-

cessfully cultivated, and grows to the height of seven feet: it admits of being frequently cut, and makes excellent hay. Cattle eat it, both in a fresh and dry state, with great avidity: hence the culture of this valuable herbage has been strongly recommended to the farmers of Cornwall and Devonshire.

[The following remarks on the culture of this grass are by the late H. LAWRENCE of South Carolina.

"In the last spring I procured from Jamacia three half pints of Guinea-grass seed, which I planted in the drills of one fourth part of an acre of very indifferent land; the seed sprung and soon covered the ground with grass four feet high and upwards. Being desirous of saving as much seed as possible, I cut one bundle of grass for horses: they ate it all with great avidity.

"In August I took one of the grass roots and divided it into twenty eight parts, which were immediately replanted: every part took root, and the whole are now growing very finely and seeding. I am of opinion this grass will make the best pasture we can wish for.....From former experience I have reason to believe the Guinea grass is perennial....It is easily managed, requires but one good hoeing, after which it will take care of itself.

I am informed a gentleman near Kingston, in Jamaca, makes upwards of 1000*l* sterling per annum by Guinea-grass hay.]

GUINEA-HEN, or *Numida meleagris*, L. an exotic species of gallinaceous fowl, which is a native of Africa. Its body is sloped in a manner similar to that of a partridge, and its dark grey colour is beautifully variegated with white spots.

Guinea-hens are not so tame and domestic as our native fowls, and frequently occasion considerable trouble to their keepers, by flying into hedges and bushes, especially during the night, where they lay, and hatch their eggs, of which they frequently deposit from 100 to 150. Nevertheless, they breed tolerably well in this climate; their flesh is generally white, tender, and sweet, though it is sometimes found perfectly black.

GUINEA-PIG, or, as it is more properly termed, the Restless Cavy, *Cavia Cobaya*, is not a native of Guinea, but of Brasil, whence it has been imported into Europe. It is about seven inches in length, and its white body is variegated with irregular black and orange-coloured spots. The female breeds at two months old, and brings forth ten, twelve, or fourteen young ones, several times in the course of the year, after a gestation of three weeks.

Guinea-pigs feed on all kinds of herbs, but are particularly fond of parsley, as likewise of apples and other fruit. In their wild state, they multiply prodigiously, and would become innumerable, if they were capable of sustaining cold and moisture. Cats are their natural enemies; but their haunts being supposed to be exempt from the inroads of rats, guinea-pigs might be usefully reared in country places infested with those predatory animals; as they afford a palatable and wholesome food. In a domestic state, they are very restless, and make a continued noise, similar to the grunt of a young pig.

GULL, or *Larus*, in ornitho-

logy, a genus of aquatic birds, comprising eleven species, the most remarkable of which is the *parasiticus*, or Dung-hunter: it is about twenty-one inches in length; the upper parts of its body, wings, and tail, are black; the lower part of the breast dusky, &c. It commonly frequents the Hebrides in the month of May, and retires about August. It is also found in the Orkney Islands, and on the coasts of Yorkshire, where it is called the *feaser*. The female constructs her nest of grass and moss, on a hillock, in some marshy situation, in which she deposits two ash-coloured eggs, spotted with black, and about the size of those of a hen... Funke, a German naturalist, informs us that these eggs are found in such numbers, on an island which is uninhabited, in the vicinity of Amsterdam, that it is lett at the annual rent of 20,000 florins.

Gulls, in general, fly but slowly; though, when in pursuit of other birds, they often attack and compel them to disgorge the fish, or other food, which the gulls devour with avidity.

GULLET, or *Oesophagus*, in anatomy, is a long, round, and capacious tube, destined to convey the food from the mouth into the stomach. It descends between the windpipe (which see) and the joints of the neck and back, as far as the fifth joint of the spine, where it turns somewhat to the right till it arrives at the ninth; where it again changes its direction towards the left, climbs over the *aorta*, or the largest blood-vessel in the human body; and, after rising above it, penetrates the midriff, and then extends to the left orifice of the stomach.

Instead of enlarging upon the situation and structure of the gullet, we shall give a few directions for removing *substances stopt between the mouth and the stomach.*

If the matter detained within the gullet, is of an alimentary or harmless nature, it may then safely be pushed down by means of a heated and oiled wax-candle, to render it flexible; because the manner in which the obstruction is formed, may often occasion death.

On the contrary, if the substances swallowed are indigestible, such as pins, needles, pieces of bone, glass, buckles, or other pointed bodies, immediate attempts should be made to extract them: when they have not descended too low, the fingers will frequently be sufficient to reach and withdraw them, but if they be deeper within the gullet, other means must be instantly adopted; as delay may prove fatal. For this purpose, the most simple instrument is a crotchet, or a kind of hook, made of smooth and thin iron wire, by bending it into an oblong ring at one end, reflecting the wire to the top, and forming a large handle: thus no pointed part, will injure the throat by introducing the hook; and there will be no danger of its slipping from the operator's hand. We have seen a more effectual instrument contrived by a double and triple ring of thin wires crossing each other in an oval form, so as to leave spaces between them, in order to loosen and extract a pin, or other sharp substance; the handle must, in either case, be somewhat bent, and accommodated to the curve of the neck.

As, however, the construction of such a crotchet requires some ingenuity; and as wires may not al-

ways be at hand, there is another more simple and expeditious method of procuring relief, by means of a small piece of dry sponge, or tough meat, which should be fastened to a fine silken or linen tape, so that after swallowing the sponge or meat, it may again be gradually extracted. Thus we have frequently seen pins, or sharp pieces of bone, removed without farther inconvenience. In order to facilitate the operation, a little lukewarm milk or water should be swallowed, by the patient, before the string is withdrawn from the throat.

If, however, none of these expedients prove successful, it will be necessary either to administer an emetic, consisting of half a dram of ipecacuanha in powder, to be taken in a draught; or, if the patient be unable to swallow, to excite vomiting by stimulating his throat with a feather dipped in sweet oil; and, if this attempt likewise be ineffectual, a clyster, made by boiling one ounce of tobacco in three quarters of a pint of water, and then straining the decoction, should be given in dangerous cases.....such an injection has often been attended with speedy vomiting, and the consequent discharge of the substance which obstructed the gullet.

After these remedies have been fairly tried, no other prospect remains of saving the patient's life, than by opening the wind-pipe, an operation which, in the hands of a skilful surgeon, is neither difficult, nor painful to the person threatened with suffocation.

GUM, a concrete vegetable juice which possesses no peculiar smell, or taste; it forms a viscid or mucilaginous solution in water, but is not acted upon either by spirits, or oils: it burns in fire without melting or inflaming, and is not dissipated by evaporation.

Gums are divided into two classes, *genuine* and *impure*. In the former class are Gum Arabic, Gum Senega, and Gum Tragacanth: and gums of plum and cherry trees, &c. The latter are such as contain a greater or less proportion of resin.

Gum Arabic exudes from the *Mimosa Nilotica*, or Egyptian Acacia, which abounds in Africa; but according to Dr. SWEDIAUR, it is chiefly obtained by boiling the roots of certain trees growing in Egypt. The best gum used in this country is of a pale yellowish colour. On account of its glutinous properties, it is preferred as a demulcent in coughs, hoarseness, and other catarrhal affections, in order to obtund or mitigate irritating acrimonies disorders, and to supply the loss of abraded mucus. It has been very generally employed in stranguaries, and other urinary complaints.

Gum Ammoniac. See vol. 1. p. 45.

Gum Copal. See COPAL.

Gum Guaiacum. See GUAIACUM.

Gum Kino. See KINO.

Gum Lac. See LAC.

Gum Senega. See SENEGA.

Gum Tragacanth. See TRAGACANTH.

Gum Elemi exudes from the *Amyris elemifera*, a native of South America, whence it is imported, and sometimes also brought from the East Indies. The best sort is rather soft and transparent, of a pale yellowish colour, inclining to green; and of a strong but pleasing smell. It was formerly employed more than it is at present,

in the *compound ointment of Elemi*, which has long been used for digesting and cleansing ulcers.

Besides its utility in medicine, *gum* is of considerable service in the Arts; and, as sufficient quantities of it cannot always be procured genuine, different persons have endeavoured to contrive such substitutes, as would effectually answer the same purposes....From these, we have selected the following, as being most easily prepared, and chiefly from substances produced in this country.

The first is the invention of Mr. ALBERT ANGELL, of Bethnal-green, Middlesex, to whom a patent was granted in January, 1781, for his *Britannic Elastic Gum*. This preparation consists of one gallon of linseed, or nut-oil, 1lb. of bees-wax, 6lbs. of glue or size, $\frac{1}{4}$lb. of verdigrease, a similar quantity of litharge, and two quarts of spring or rain-water. These ingredients are to be melted in an iron kettle, till they acquire the consistence of gum. The patentee observes, that such composition is particularly serviceable in the various branches of portrait and house-painting, as it renders the colours durable, and free from *peeling*; it is also said to be of great utility in the gilding, painting, &c. of silks, calicoes, &c. and in dressing silk, linen, or cotton, in the loom, instead of gum or paste, so as to strengthen the threads of the finest cottons. He states a variety of other uses, a minute account of which the curious reader will find in the 3d vol. of the "*Repertory of Arts and Manufactures*."

Another patent was obtained in June 1788, by Mr. FRANCIS BLAIKIE, of Glasgow, merchant, for the invention (discovered to him) of a substitute for gum, in thickening colours for printing, which fully answers the purpose, and at a more reasonable rate. This article is prepared by boiling flax-seed in water, till the whole substance is completely extracted; the liquor is next to be strained through a linen or woollen cloth, and boiled down to the consistence of a jelly. It is then to be put into a close vessel, and a small quantity of spirits, or sweet oil, poured on the top, in order to preserve it in a fresh state. In using this substitute, the printer is directed to put a certain portion into a gallon of *colour*, according to the nature of the latter, and the particular kind of work; while he should regulate himself by trial, in the same manner as is practised in employing common gum.

GUM, or GUM-SECRETION, in horticulture, is a kind of gangrene, or morbid production of gummy matter, exuding from the wounded alburnum or sap-wood of deciduous trees, arising from various causes, but mostly from injudicious pruning; bruises, or injuries committed on the wood, or bark, by the hammer in nailing the branches against walls; pinching the shoots by making the trellises too tight, or by driving the nails too closely to the branches. It may also be occasioned by leaving the foot-stalks of the fruit after this has been gathered; by carelessly applying ladders; and especially where large boughs have been broken off, or inadvertently lopped.

This distemper may be known before the gummy secretion actually takes place, by the bark assuming a brownish cast, that gradually deepens, till the gum at

length exudes in the form of small blisters. As soon as any of these symptoms are perceived, Mr. Forsyth directs the infected part to be cut out with a sharp knife, till the clean white bark and wood appear; after which the *composition* and *powder* should be speedily applied. Lastly, in case any gum ooze out of the tree, it must be immediately craped off; as the disease will otherwise rapidly increase: the best time for this operation, in the opinion of Mr. F. is during wet weather; because the gum being moistened, may then be easily removed without injuring the bark.

Cherry and other stone-fruit trees are particularly affected with this exudation of gum, which, however, concretes in dry weather, and thus its farther discharge is prevented: otherwise the tree would *weep*, and perish from a deficiency of nourishment.

Dr. Darwin conjectures this gummy substance to be part of the nutritious fluid designed for the new buds, which are usually formed in the summer. He proposes to obviate its exudation, by fastening a thin plate of lead on the part affected, which is previously made smooth with a knife, so that no rain or dew can penetrate: a piece of sponge, soft leather, or India rubber, might be bound on the tree beneath the lead, till the wound is healed. The doctor suggests another method of closing the wound; namely, to cut out a piece of bark from a tree of inferior value, but similar nature; to adapt it to the wounded part, after its edges are nicely smoothed, and to tie it on with list, flannel, or other bandage; in order that its elasticity may secure a continual pressure, without injuring the bark.

Mr. Bucknall, who has made some ingenious observations on the formation of gum, in the 12th vol. of the "*Transactisns of the Society for the Encouragement of Arts*," &c. disapproves of smearing the diseased tree with tar, or any other substance that may impede the proper circulation and perspiration of the juices, as it must necessarily hurt the tree. The best remedy, in his opinion, is the *medication* [vol. 21. p. 498.] for, being applied simply like a plaster, and not being extended farther than is required by the bare wood or torn bark where the gum oozes forth, it is not attended with those unfavourable effects. He farther assures the Society, that in each of these cases, "the medication becomes supremely salutary," on account of its drying qualities; for the wounds heal in one half of the time they would close, when exposed to heat, cold, moisture, and vermin.

GUM, or Yellow Gum, is a species of *Jaundice*, to which infants are liable, in consequence of a retention of the meconium, or when the bowels are obstructed after their birth.

This affection may be cured, by occasionally administering a weak solution of tartar emetic, in the proportion of half a grain to four ounces of water, sweetened with manna, till it operate either by stool, or by vomiting: after which, a small tea-spoonful of castor-oil should be given in water-gruel. But as the former medicine must be used with great precaution, we would preferably recommend one or two grains of ipecacuanha to be

infused in an ounce of water, with a dram or two of manna, and to be taken in divided doses. If, however, the complaint be attended with convulsions, the infant may be immersed in a warm bath, and expeditiously wiped; a practice which is generally attended with better effects than the swallowing of paregoric elixir, laudanum, and other antispasmodics; even though such remedies should consist only of single drops, or half drops. Hence, we seriously caution parents and nurses against those precarious drugs, which cannot fail to undermine the constitutions of children.

GUM-BOIL, *Parulis*, is an affection of the gums, commencing with inflammation, and generally terminating in an abscess.

Gum-boils usually arise from violent pains in the teeth. They are to be treated with discutients, like other inflammatory tumors, but, if these fail, or the disorder be neglected, it is apt to produce a fistula. A gargle prepared of an infusion of sage, chamomile, and elder-flowers boiled in milk and water, may with advantage be frequently held in the mouth, and the remaining herbs sewed up in a bag, and applied to the cheek; or, a half-roasted fig held within the mouth to the part affected, sometimes affords great relief. When the softness of the tumour evinces that the matter is properly suppurated, it should without delay be opened by the lancet, to prevent the matter from lodging there, eroding the bone, and causing a fistula, or caries. After this operation is performed, the matter should be gently pressed out with the fingers, and the mouth frequently washed with lukewarm Port-wine and water.

But, when the ulcer has penetrated to a considerable depth, it will be necessary to inject the last-mentioned mixture with a syringe, and compress the part affected by a proper external bandage. If the affection assume a fistulus appearance, and have callous edges, it may even then be cured, by injecting the compound tincture of aloes, and continuing it for some time. Should, however, all these remedies prove ineffectual, the fistula must be laid open by incision, and the caries removed by medicines, caustics, or the actual cautery.

GUMS, in anatomy, are hard fleshy substances in both jaws, surrounding the teeth, and keeping them firm in their sockets.

Gums frequently become spongy, and separate from the teeth: this is often occasioned by a tartarous kind of crust, which is formed about them, and, on the separation of which, the gums return to their pristine state: to promote this favourable change, they should occasionally, though gently, be rubbed with a mixture, consisting of four parts of an infusion of roses, and one part of the tincture of myrrh.

Another disorder incident to human gums is the scurvy, which frequently breaks out on them, while it does not appear on any other part of the body. Indeed, when a scorbutic complaint attacks the whole system, the first symptom is a putrid state of the gums. In such case, a rigid diet, consisting chiefly of ripe fruit and mucilaginous vegetables, will be the best corrective. Externally, a fine powder, prepared of three parts of double refined sugar, and one part of burnt alum, may be employed for rubbing them two or three

times a day; because sugar is an excellent antiseptic, even as an article of diet: a whole ship's company has been cured of a formidable scurvy, by living from necessity, for some time, on no other aliment.

GUN, or MUSQUET, in the military art, is a kind of fire-arms, or weapon of offence, which forcibly discharges a ball, or other hard and solid substance, through a cylindrical tube, by means of inflamed gunpowder.

Although the precise time when these instruments of death were first invented, is involved in obscurity, yet the introduction of guns into the western part of the world, is but of modern date.

Among the various patents obtained by gun-makers, we shall only mention one granted in 1801; to Mr. JOHN PROSSER, of Charing-cross, London, sword-cutler, for a new contrived *water-proof pan and hammer*, for gun and pistol locks. The invention consists in applying a hammer of nearly the usual form, but instead of the common plain screw-pin round which it revolves, and which attaches it to the stock, the patentee has substituted a very large pin, of sufficient dimensions to allow of its being hollowed out and perforated, and in the axis of the hammer he places the pan to contain the priming, and to communicate the fire to the chamber of the piece. See also FIRE-ARMS.

As numerous misfortunes happen with loaded guns and pistols, especially to careless youths and children, we suggest the propriety of removing the *flint* every time fire-arms are carried into a house; or never to suffer young people to touch them. Indeed, the artist who will contrive a moveable hammer, or at least the upper part of the hammer containing the flint, which may be easily and instantly fixed on the spur of the occasion, would be the instrument of saving many useful lives, and well deserves to be rewarded by the public; for all other inventions of stop-locks, &c. do not afford sufficient security.

[GUNNY-BAGS. A species of bagging in the East Indies, employed to bring over sugar, salt-petre, pepper and coffee. The plant which yields the fibre whence this flax-like substance is obtained, is called by the natives of Bengal, *Paat*, with additional names to distinguish the several varieties. The fibre is called *Jute*, and much cultivated in Bengal for the purpose of making sacking, ropes and twine. The cost of this article in Bengal is about 67 cents per cwt.

Strong *Demy*, *Crown*, and cartridge paper, for grocers, druggists, &c. may be made from this article, as shall be more particularly stated under the article PAPER.]

GUNPOWDER, a granulated composition of salt-petre, sulphur, and charcoal, which readily takes fire, and when secluded from the air, rarefies or expands with great vehemence, by means of its elastic force.

The invention of gunpowder is attributed to BARTHOLD SCHWARTZ, a German monk; but there is reason to believe it was not unknown in the time of ALEXANDER the Great; and that ROGER BACON, in 1292, understood the nature of its component parts; though it was generally introduced into Europe only about the middle of the 14th century.

The effects of gunpowder, in mines, &c. may be considerably

increased, by leaving some space between the powder and the wadding. Hence, in loading a screw-barrel pistol, care should be taken that the cavity for the powder be entirely filled, so as to leave no space between it and the ball, because musquets.fowling pieces,&c. are very apt to burst, if the wadding be not rammed down close to the powder.

In BIRCH's *History of the Royal Society*, we are informed, that Prince RUPERT manufactured gunpowder of a force exceeding the best kind made at present, in the proportion of 21 to 2; and that such superior quality is to be ascribed chiefly to a peculiar method of purifying the nitre, and employing charcoal obtained from the wood of the alder buck-thorn.

[Mr. R. COLEMAN, of the *Royal Mills Waltham Abbey*, gives an excellent paper on the subject of gunpowder, from which the following is extracted....See TILLOCH's *Philosophical Magazine*, vol. 9.

Gun-powder is made from the following proportions of the ingredients, viz. to each hundred

Salt-petre,	75
Charcoal,	15
Sulphur,	10

The first thing to be attended to, is the purity of the articles.

The salt-petre is refined by solution, filtration, evaporation, and chrystalization: after which it is fused, taking care not to use too much heat, that there may not be any danger of decomposing the nitre: by this means, it is not only rendered more pure, but the water of chrystalization more certainly got rid of.

The sulphur is refined by melting and skimming; the most impure is refined by sublimation.

The charcoal is best made in the following manner: The wood to be charred is first cut into lengths of about nine inches, and then put into an iron cylinder or retort, which is placed horizontally. The front opening of the cylinder is then closely stopped: at the farther end are pipes leading into casks. The fire being made under the cylinder the pyro-ligneous acid, attended with a large portion of *carbonated hydrogen gas*, comes over. The gas escapes, and the acid liquor is collected in the casks. The fire is kept up till no more gas or liquor comes over and the carbon remains in the cylinder. The proportion of powder used for the several pieces of ordnance by the navy, has been reduced one third in consequence of the increased strength of the composition into which this cylinder charcoal enters.

The wood must be felled in the summer, and must have the bark taken off before charring. The wood used is either alder, willow, or (black) dogwood. But if distilled, the choice of wood is not material. 1. Each ingredient must be separately ground to a fine powder; 2. Mixed together in the proper proportions; 3. The composition is then sent to the gunpowder-mill, which consists of two stones vertically placed, and running on a bed-stone. On this bed-stone the composition is spread, and wetted with as small a quantity of water, as will, together with the revolutions and weight of the runners, bring it into a proper body, but not into a paste. Only about forty or fifty pounds of composition are worked at a time; these mills are worked either by water or horses.

The composition taken from the mills is sent to the corning house

to be corned or grained. Here it is first passed into a hard and firm body, broken into small lumps, and the powder then grained, by these lumps being put into sieves, in each of which is a flat circular piece of lignum vitæ. The sieves are made of parchment skins, having round holes punched through them: several of these sieves are fixed in a frame, which by proper machinery has such a motion given to it, as to make the lignum vitæ runner in each sieve, go round with quick velocity, breaking the lumps of powder, and forcing them through the sieves, forming grains of several sizes. The grains are then separated from the dust by proper sieves and reels.

They are then hardened, and the rougher edges taken off, by being run a sufficient length of time in a close reel, having a proper circular velocity given it.

The powder, thus corned, dusted and reeled, is sent to the stove and dried; taking care not to raise the heat so as to decompose the sulphur. The heat is regulated by a thermometer placed in the door of the stoves, if dried in a gloom stove. This gloom is not in a heated state, when the powder is taken in and out of the stove, and is furnished with a copper and other coverings. The Editor, Mr. Tilloch, suggests the propriety of heating the stove by means of steam tubes, and Mr. Coleman approves the plan.

A good idea may be formed of the purity of gun-powder, and some conclusion as to its strength, by the following mode:

Lay two or three small heaps (a dram or two) on separate pieces of clean writing paper: fire one of them by a red hot iron wire; if the flame ascends quickly, with a good report, leaving the paper free from white specks, and does not burn it into holes; and if no sparks fly off, setting fire to the adjoining heaps, the goodness of the ingredients and proper manufacture of the powder may be safely inferred; but if otherwise, it is either badly made, or the ingredients impure. The strength of gun-powder does not depend on the granulation, the dust of gun-gowder, after manufacture, having nearly the same force as when granulated.

The following observations are an abridgment of an excellent paper by the Hon. Mr. Napier.,.. (See *Trans. Royal Irish Academy*.)

The impurity of nitre may be detected by dropping a strong solution of sugar of lead into a phial of distilled water, saturated with salt-petre, which if it retained any considerable portion of magnesia, or marine salt, will assume a turbid or milky appearance. He has reason to believe, that powder, made with salt-petre oftener than four times refined, is of inferior strength, though probably more durable, than with that which has only been twice depurated.

In the choice of salt-petre, he prefers that with crystals of a moderate size, solid, transparently white, which do not readily break with a crackling noise when gently grasped in the hand, and which when ignited on a red hot shovel, do not greatly decrepitate, but melt and consume with an equal and continued inflammation: the first of these symptoms is produced by hasty and imperfect desiccation, and the last is a proof that the marine salt has not been entirely separated from the nitre. He advises: 1. That the nitre be thrice boiled, carefully skimming off the

feculent matter which floats on the surface, and abstracting the marine salt, which being crystalized by evaporation during the process, falls to the bottom; 2. To filter through canvass made into the form of a jelly bag, leaving it to crystalize after each elixation, in leaden or copper vessels, exposed to a free circulation of air. in a dry situation, and not in a cold cellar; 3. To avoid the cakes deposited towards the bottom of the pans; 4. To the mother water, oozing from the pans, add to the mixture a small quantity of wood ashes, and repeat the operation of extracting; 5. To use iron boilers and leaden pans.

The sulphur is to be melted in an iron pot, over a *gentle charcoal* fire, which does not blaze, and strained through a double linen cloth, and the operation repeated until there is little or no residuum. The combination of the ingredients should be performed in clear dry weather. Stamping mills, consisting of large iron mortars, and wooden pestles, are preferable for the *commencement* of the mixing and twenty-four hours are little enough to work gun-powder. The *rollers should be of cast iron, as well as the circular trough in which they move. The periphery of the cylinder ought to be divided into eight equal parts, alternately grooved and plain, with two of the flu'ed divisions having their grooves transverse, the other two longitudinal.* These grooves should be one inch broad, and a quarter of an inch deep, with their angles rounded off: the trough smooth. Oil applied in small quantities to the fluted rollers will prevent the adhesion of the paste to the grooves. Mr. NAPIER gives a plate of the rollers he recommends.

Glazing the powder reduces its strength about one fifth, if the powder be good. But it keeps better; hence is proper for exportation.

Mr. NAPIER observes, that it would be a wise measure in government, to adopt the practice of glazing all high proof powder, and reserving it for foreign garrisons, where it must remain long in the magazine, as powder of this description retains its grain better, and is consequently more durable, than when unglazed.

Frequently reversing the barrels preserves powder, by preventing the effects of that kind of decomposition arising from the different specific gravities of the ingredients. When barrelling powder, it is of great consequence to chuse *dry clear weather.* Moderately sized and somewhat spherical grained powder is best. It should be dried very slowly, and *not tried until after being manufactured two months;* as, when fresh, it will rise to high proof; but being left in the magazine for a month, will lower in strength at least one fourth.

Salt of tartar mixed with gunpowder, *increases the report astonishingly*, but is noxious to strength and durability.

To the above *important* practical observations on this subject, a few remarks shall be added.

1. The improved mode mentioned by Mr. COLEMAN, of preparing the charcoal is certainly of great importance, and ought to be generally adopted. It is inconceivable how pure the charcoal is rendered by this process, and what a quantity of water and tar are produced in the operation. The editor made an attempt last year

to have some powder manufactured with distilled charcoal, and very pure sulphur, in order to discover its superior power, but the foreman of the manufactory alarmed at the attempt to improve upon the business, which he thought had arrived under his direction, at its *ultimatum* of perfection, spoiled the mass by an incomplete mixture of the ingredients; so that when some of the composition was thrown into the fire, the sulphur might be seen burning before the whole inflamed.

Maple wood is found to answer very well for charcoal.

2. As the goodness of gunpowder must depend as much upon the intimate mixture of its component parts, as upon the purity of the several ingredients, it must strike every one, that the form of the rollers described by Mr. NAPIER is admirably adapted for the purpose.

3. The United States have within a few years past, suffered a great loss, by the navy powder absorbing so much moisture, as to render it unfit for use in a second cruise. To remedy this evil, the vessels intended to preserve gunpowder, ought to be perfectly air-tight.... Neither wood nor tin, however close, effectually secure the article from moisture. It has been remarked that any vessel in which salt of tartar can be preserved dry, will of course keep gunpowder in the same state of perfection as when first inclosed. Demijohns wickered, and packed in hay, would answer well to keep powder if filled to the top, corked, covered with bladder, and rosin put over the whole. Kegs made of well seasoned oak, lined with lead, and surrounded by powdered charcoal packed tight, might be used with nearly equal advantage.

For domestic purposes, "a turned brass or pewter neck, like that of a common phial, and capable of being likewise stopped with a small cork, well soldered into the top, would answer well. A projection would perhaps render them inconvenient for package, and it would therefore be proper that the neck would be sunk into the top; and in order to get out the contents, it should be let into a semi-cylindrical hollow in the side of the canister. When corked up, the top of the cork might be cut off, and the whole aperture covered with a plaster of thick drying paint, or wax or turpentine, spread on a piece of tin-foil. NICHOLSON'S *Jounral*, vol. 1."]

GUN-SHOT *Wounds*. See WOUNDS.

GUTTA SERENA, or *Amaurosis*, signifies the loss of sight without any other visible cause or defect in the eye; except that the pupil (or the round hole for admitting the rays of light) is generally deprived of its power of contraction.

Numerous are the causes from which this unfortunate blindness may arise; but the principal of them are nervous and paralytic affections. Violent contusions of the head; apoplectic fits; *hot* baths; suppression of catarrhs, or periodical evacuations; metallic cosmetics; drunkenness; sudden flashes of lightning; repulsion of cutaneous eruptions; long fasting; frequent exposure to the rays of the sun; violent exercise and passions, especially terror and anger; as well as purgatives, rheumatisms, sneezing; explosion of gums; copious blood-letting; vomiting; worms, &c. all may occasion *amaurosis*.

Among the remedies which have

been found the most effectual for removing this melancholy disease, are electricity; the cold bath; hot embrocations, or blisters containing antimonial tartar applied to the spine; leeches to the eyes of plethoric patients; the magnet fastened to the nape of the neck, and a bag of iron-filings placed over the eyes; agitation of the frontal nerve; artificial ulcers; scarifications, or issues and blisters on the back part of the head, kept open for a considerable time; cupping; sinapisms, &c. while the body should never be suffered to become costive. For this purpose, we preferably recommend small doses of tartarized kali with Peruvian bark, namely, one or two drams of the former, and one or two scruples of the latter, to be taken once a-day or oftener, as occasion may require.....Mercurial remedies have also been used with great advantage; but they ought to be regularly prescribed.

There is another disease, called *cataract*, namely, a dimness or loss of sight from the interposition of an opaque film, either in the eye itself, or in the eye-lids. This malady generally takes place by imperceptible degrees; it is often consequent to inflammations of the eyes, and arises from the abuse of spirituous liquors, external injury, and mortification; acrid vapours, &c. In the commencement of this complaint, similar remedies to those mentioned for the cure of gutta serena, may be used with advantage; beside which, emollient cataplasms and fomentations are of service to check the progress of the affection. If, however, it has continued for some time, the cataract must be couched, or extracted by the skilful hand of a surgeon; as there is no other prospect of removing it: though electricity and mercurial purgatives, together with a poultice of fresh hemlock constantly kept upon the eye, and a permanent blister on the neck, are said to have sometimes afforded relief.

GUTTERS, in building, denote canals in the roofs of houses, for receiving and carrying off rain-water. They are also formed in streets, for similar purposes.

Gutters in agriculture, may be so disposed as to communicate with a large pond, or reservoir, for containing a fresh supply of water for cattle.

In the 4th vol. of the "*Transactions of the Society for the Encouragement of Arts*," &c. Mr. HARRIOT recommends the formation of gutters made of elm, 18 inches wide, 12 inches deep, and 50 feet in length, with proper lids at each end, to let the water in or out at pleasure. This drain ought to lie 3½ feet lower than the surface of the earth; for, in Mr. HARRIOT's opinion, nothing can be more absurd than the general mode of arranging square gutters; because there is no comparison in the discharge of water from a flat gutter, of the same number of cubic inches, with that of a square one.

GYMNASTICS, or the ATHLETIC ART, denotes the dexterous performance of certain exercises of the body, whether for defence, health, or amusement.

On the first institution of society, men being aware of the necessity and advantage of military manœuvres, for repelling the attacks of enemies, national games were establised: and public rewards were granted for the encourgement of youth. These exercises consisted

of running, leaping, swimming, wrestling, &c. Although, from the change of manners, and the different systems of tactics now prevailing, such games become less requisite, yet as they doubtless contribute to the preservation of health, and tend to invigorate the juvenile body, we conceive that they might, with certain restrictions be advantageously re-established in academies. A discussion of this interesting subject, however, being foreign to our plan, we refer the reader to M. SALZMANN's "*Gymnastics for Youth*," 8vo. 1800; which is an useful practical guide, and merits the attention of those who are concerned in the superintendance of schools. [This work is reprinted in the U. States.]

GYPSUM, or PLASTER-STONE, a native combination of calcareous earth, with vitriolic acid. It is more loose and friable than lime-stone, and does not effervesce with acids, either in a crude or calcined state. But, though easily reduced to powder in the fire, it is, according to CRONSTEDT, nearly as difficult of fusion as lime-stone.

There are various species of gypsum discovered in Saxony, Spain, Italy, and other parts of Europe [and bay of Fundy]; and substances of a gypsous nature also abound in several parts of Britain. Those found in the counties of Derby and Nottingham, are so fine as to admit of being polished, and manufactured into vases, &c. in a manner similar to alabaster.

The chief use of gypsum, however, is as a material for small ornaments and figures, as well as moulds for casting wax-work, &c. But, within a few years, it has been advantageously employed for fertilizing the soil; and various experiments have been made by different agriculturists, to ascertain its efficacy. From these, it appears to be a most valuable manure; and a correspondent in the 5th volume of the "*Letters of the Bath and West of England Society*," states, that he covered a piece of grass-land two inches thick, with barn-manure; while, on another part of the same exhausted land, he scattered gypsum or plaster of Paris, in order to compare its effects with those of dung. Both spots were mowed twice in the same year, and once in the succeeding: in every crop the land covered with gypsum was more productive. The effects of the latter manure on cabbages and turnips were equally beneficial; and particularly uplands, which were completely exhausted, and abandoned on account of their sandy nature, have thus been rendered fertile. These experiments have been conducted to a very extensive plan in the United States of America, especially in Pennsylvania; while two crops of grass were annually cut from sandy heights, the first of which yielded upon an average two tons per acre, and the latter, one; nor has this produce decreased after a succession of six years. In the same State, an old wheat-field was manured with gypsum about ten days after the harvest; in the ensuing March it was sown with clover; and early in September more than two tons of rich clover were obtained from each acre..... Nine additional bushels of corn per acre were, likewise, produced in that country by a similar treatment of the soil.

Although the numerous experi-

ments made in Britain have not succeeded in every instance, yet the superiority of gypsum over every other manure, for chalky and dry calcareous lands, has been clearly evinced.

In the year 1791, Mr. ARTHUR YOUNG scattered on a field of good turnip loam with a gravelly bottom, at the rate of five bushels of gypsum per acre, part of which was afterwards sown with clover, and the rest with wheat. The ensuing summer was uncommonly dry; and, though, both the wheat and clover were eventually burnt up, yet previous to the drought, the latter was not only considerably higher, but also thicker, of a deeper, and far more luxuriant colour, and of a broader leaf than any other clover that had not been thus manured. No alteration, however, was discernable in the wheat. Mr. YOUNG concludes his account ("*Annals of Agriculture*," vol. 16.) with observing, that neither a similar quantity of night-soil, pigeons' dung, peat-ashes, nor any other substance with which he is acquainted, would have had an equal effect.

In the 17th vol. of the work last quoted, there is an account extracted from a provincial paper, concerning the effects of gypsum; from which it appears that, if oats be immersed in water, drained, and then gradually mixed with plaster of Paris, till the former were sufficiently dry to be sown evenly, the produce of such prepared oats will be much finer, and far more luxuriant, than from unprepared seed. One bushel of gypsum only was mixed with eight of oats, from which were produced 122 bushels, while 96 only were obtained from an equal quantity with many previous preparation. The clear profit therefore, was 26 bushels of fine oats, and, if the increased weight of 1½lb. be allowed, it will amount to *thirty bushels and a half!*

Sainfoin, grass, and clover, seem to receive the greatest benefit from gypsum, which, for the purpose of manure, ought to be previously broken, either by the hand with hammers, or by mill stones, and then sifted: in this pulverized state, it may be scattered on the land, at any season of the year, in the proportion of eight or nine bushels per acre. The best time, however, for strewing this dry manure, is previous to gentle showers, by the aid of which its efficacy will be considerably increased.

Mr. KIRWAN affirms, in his excellent "*Treatise on Manures*," that the gypsum successfully employed in agriculture is of a fibrous texture; and in his opinion clay-soils are more improved by it than the calcareous. This assertion appears to contradict the experience of those who have employed that substance on a large scale, and especially the American farmers. We shall not attempt to reconcile these differences, because the same manure may be attended with opposite effects on soils variously mixed and combined.

Mr. KIRWAN observes, that the theory of the effects of gypsum is to be deduced from its uncommon *septic* property; because it accelerates putrefaction in a higher degree than any other substance. Hence it ought not to be ploughed in, but merely deposited on the surface of the land, in order that the old grass may be speedily converted into coal, to nourish the young vegetables.

Mr. DARWIN, however, ques-

tions these deductions concerning bodies promoting putrefaction; as the advancement of that process has, in general, been judged of simply by the exhaling odour; which is liable to be altered, or destroyed, by its union with many bodies, without otherwise effecting the tendency to dissolution.

For the prevention of fatal accidents from either swallowing, or inhaling, gypsous matter, we refer the reader to the article LIME, which requires similar precautions and antidotes.]

[The history of the introduction of this inestimable article into the state of Pennsylvania is of importance, as it will tend to add another instance to the many with which the world abounds, of the great prejudices which oppose those who attempt improvements, and of the difficulties that attend the laying aside old established habits and practices however absurd, or unprofitable. The history of our progress in the use of gypsum in Pennsylvania, will also serve as powerful encouragement to those who have experienced the benefit of new processes, but are deterred from making them public by the fear of ridicule from fools, the opposition of theorists or the mortification arising from the neglect of the careless.

About thirty-eight years since, Mr. GUYGER, a native of *Koshehopen*, Bucks county, Pennsylvania, who had removed to Germany, sent a keg of ground *gypsum* to Mr. JACOB BARGE, innkeeper of Philadelphia, and mentioned that it had been found highly beneficial in Germany, as a manure for clover, requesting him to purchase any farm on which the stone was to be found, as he wished to return to America. The keg was left at Rotterdam, to which place it was sent to be shipped; but Mr. B. determined upon putting to the test the character given of the stone. He therefore obtained some from a manufacturer of burr mill-stones in Philadelphia, and strewed it in the spring, on a moist place,(where a scythe never had been used,) in a water meadow belonging to Mr. HOCKER of White Marsh.

The first account Mr. B. had of the success of the experiment was after some months, when he was informed of the uncommon luxuriance of the grass, and of its superiority to that in other parts of the meadow. Mr. HOCKER being convinced, immediately tried the *gypsum*, and Mr. LANCASTER, his neighbour followed his example. Mr. CLIFFORD near Bristol, Pennsylvania, and DAVID DESHLER of Philadelphia also used it at an early period. Afterwards the late Mr. STONEBURNER of Germantown used it, and by the superiority of his crop of grass over those of his neighbours, who had manured very highly with stable manure, shewed them its importance, and induced them to employ it. The uncommon product of the land when strewed with the gypsum, as might be expected, became a general subject of conversation, and the demand became so great, that Mr. BARGE was induced to erect a hand-mill to grind it. He also continued to use it in the vicinity of Philadelphia, and thus to spread its fame. RICHARD PETERS, Esq. also became an early proselyte to the opinion of its virtues, and has done much towards destroying the prejudices against it, by pointing out the particular soils in which it answers best. Still, however, from

the absurdity of some people, who expected it to do wonders on all soils, in all situations, in every crop, and under all circumstances, and did not find it answer their expectations, doubted the facts stated, and even opposed its use. But all opposition has been surmounted, and it is now in such demand, that the importation of this article alone gives employ to many vessels from the bay of Fundy: and few waggons leave Philadelphia without carrying some home. Mills going by horses are erected with the sole view of grinding it, and machinery for the same purpose is connected with the grist-mills throughout the country.

The utility of *gypsum* to grass, was discovered in the following way, as stated by Mr. Guyger to Mr. Barge :....A labourer at a gypsum quarry, near Hillburn in Germany, was in the habit of walking across a meadow after his work, in order to shorten the distance home: and that he might avoid a discovery of the trespass, he frequently varied his direction. In the course of the season, he remarked the uncommon luxuriance of the grass in the directions which he had been accustomed to take in his route home, and imagining that it must have proceeded from the dust of the gypsum which fell from his clothes, tried the experiment to determine the point. The event answered his expectations. The effect was communicated to the Prince to whom the district belonged, and soon made public.

We owe much to R. Peters, Esq. for the pains he took a few years since in collecting from various intelligent practical farmers in Pennsylvania, the result of their experience with respect to gypsum; and for embodying it in a small volume*. The information obtained was in the way of answers to a set of very judicious queries proposed by him; these queries have also been answered by himself, and as they are more full than most of the others, we shall insert them here, together with his miscellaneous observations on the same subject. Every farmer should attentively read the instructive compend from which they are taken.

" *Query* 1st. How long have you used the Plaister of Paris as a manure?

Answer. About twenty-five years. I was among the first who began the use of it in Pennsylvania.

Query 2d. In what condition was your land when you began to apply it?

Answer. Worn out by long and bad culture; full of weeds and other noxious plants; some annual, others perennial.

Query 3d. What quantity per acre have you generally used?

Answer. From four to six bushels, at one strewing, I have formerly thought the proper quantity per acre; but lately I have not commonly exceeded three bushels. I have had as much effect from two bushels, as from any greater quantity per acre, when season and other favourable circumstances combined. It is difficult to fix the requisite quantity, as the effect much depends on accidents of weather, &c. which cannot be calculated with any certainty. There appears to be a certain point in the operation of plaister, which is not

* Entitled, " *Agricultural Enquiries on Plaster of Paris.*" Philadelphia, Cist, 104 North Second Street, 1797.

gained by additional quantity, so much as by a combination, with extraneous circumstances, difficult to trace or account for. When this *point of saturation* is arrived at, I question whether any increase of quantity will extend the effects. On the principle that *gyps* is a *salt*, and salts check fermentation when applied in too great quantities, it may be presumed, that the requisite quantity of plaister is regulated by the fermentable putrifying substances it finds in the earth on which it is strewed. If these be scarce, a great quantity of plaister beyond what is necessary to operate with them, is hurtful. I remember to have sowed, on a strip across a field, some years ago, a great dressing of plaister; perhaps in the proportion of ten bushels to the acre. *This strip produced little or nothing*, *till I dunged the field for wheat*, *two or three seasons after the over dose of plaister*. I was surprised by this small strip recovering itself, and remaining for years superior to any other part of the field. Yet I have heard of ten bushels to the acre, being strewed to good effect. But I know not the state of the ground, as to the pabulum for the gyps. I never found it beneficial to sow the plaister in any such quantity. I many years ago divided half an acre of ground into square perches, to try the effects of common salt. I began by scattering a proportion of two bushels of salt to the acre, increasing the quantity on every perch. I numbered the divisions, and kept an account of salt sown, and the produce of wheat with which the whole was sown. I have not the memorandum of this experiment at hand, but I think the wheat dwindled with eight bushels to the acre, and nothing grew after, I believe, the proportion of twelve bushels of salt. I mention it now, because it seems analogous to the present subject; for I recovered the ground by moderate dunging. The spot salted might be perceived for many years afterwards, by the extraordinary verdure of the grass (chiefly white clover) which grew spontaneously on it.

Query 4th. What soils are the most proper for this manure?

Answer. Light soils, dry and sandy, or loamy. On *clay* I never succeed, though I have heard of its being used on clay with a degree of success. Where it has any success on clay, it is rare. The President (General Washington) whose lands at Mount Vernon and in its neighbourhood, are generally strong clay, or inclining thereto, informed me, that he had "tried the plaister of Paris on his land (which is stiff and cold) at the rate of from 1 to 20 bushels to the acre. It has been spread on grass and ploughed land. On the latter it has been ploughed in; harrowed in with a common tined harrow; bush harrow; and not harrowed at all. The effects in *either*, and *all* the cases, were not more than if he had taken up as many bushels of the same earth and scattered them again over the surface of the ground. Yet, he believes in, *and is a friend to gypsum as a manure*." On wet soils I have always failed. I have strewed it on mossy swamps. On elevated spots in these swamps, it has killed the moss and thrown up white clover wonderfully; but has done nothing where the water around these spots continued on the ground in the smallest degree.

I have heard of some instances to the contrary, but none have fallen under my observation.

Query 5th. Have you repeated the application of it with or without ploughing? at what intervals, and with what effects?

Query 6. Do you find that it renders the earth steril after its useful effects are gone?

Answer. I have beneficially repeated the application with and without ploughing; but I succeed best in a repetition after cultivating, and dressing slightly with stable manure or with ploughing in green manures. I have ploughed in buck-wheat in full blossom (which in a fortnight or three weeks, often in less time, becomes putrified and converted into excellent manure, having undergone a violent fermentation) and sown winter grain, on which I have sown clover seed; and having strewed plaister on the clover, similar, if not greater effects, have been produced than were received from the first dressing. *Ploughing* in *clover affords* a pabulum *for* the plaister, which fails often in mellow grounds in fine tilth, were the putrified substances are scarce, or have been exhausted by ploughing and frequent exposure. In short, I find it must have something to feed on, as some farmers express it. In the first application, it has the decayed roots of vegetable substances it finds in the earth. I perceive no greater degree of sterility after plaister, than after dung. All manures are stimulants, and leave the earth wearied and vapid, from the exertions they have excited. Stable dung as bad as any, if not worse; as it leaves the ground full of weeds, unless it be sufficiently rotted, or used in compost.

Query 7th. To what products can it be most profitably applied? grain and what kinds? grasses and what kinds?

Answer. I never found any beneficial effects from strewing it on winter grain. It is useful for all leguminous plants, buck-wheat, flax, hemp, rape and other plants, whose seed produces oil. It is also beneficial for most products of the kitchen garden and fruit trees; Indian corn and turnips. Oats and barley seed, wet, and covered with as much plaister as will adhere to them, are much benefited. I have found little or no use in a top-dressing of plaister on either of these latter grains. It is generally most profitably used for red clover; though it will do excellent service to any grass. White clover, being the natural grass of most countries in certain soils, is most commonly thrown up by plaister, (as it is by several other manures) though there was no appearance of this grass before the application.

Query 8th. When is the best time to scatter it?

Answer. I have sown it in most seasons of the year. If strewed in the fall, and a dry frosty winter succeeds, much of the plaister is blown away. I have found it answer well, if sown at any time from the beginning of February to the middle of April, in misty weather. I have frequently sown it on the snow in February, and it has done well. Some do not sow it till the vegetation begins. It seems to me, that if strewed at any season, it will have an effect; though, perhaps, in a greater or less degree, according to the state of the weather, or other accidental causes.

Query 9th. What is the greatest product of grass per acre, you

have known by means of plaister?

Answer. As much as from any other manure. I never weighed, or kept any exact account. I think I have had five tons per acre, at two cuttings, in one season; and I have sometimes cut a third crop; though I seldom do this, as I prefer feeding the third growth. The hay is, in my opinion, better than that produced by dung. The cattle waste less of it. I have dunged part of a field, and plaistered the residue. The cattle and horses will reject the grass on the dunged part, while they can get the smallest bite off that plaistered.... I have never desired over luxuriant crops of grass. The hay of these is not so nutritive as that of a moderate growth. The stock will not consume it to advantage, though I often salt it. I am content if I get a ton and an half, at a cutting, on the acre. This will stand well to the scythe, and does not, like over luxuriant grass, die, rot, or become feculent and musty at the root.

Query 10th. Have you ever used it on ground dressed with other manure, and what? and the effects, if any, superior to the plaister alone?

Answer. The answers to 5 and 6 comprehend, for the most part, what I have to say on this query. In England, it is said the plaister fails where the "land has been *limed:* that it operates best on virgin soils, and does not answer on lands which have been long under tillage." We find the direct contrary effects here. It is true, we do not lime here so highly as they do in England. Our lands will not bear so much lime as theirs. We have as good and as bad land as that of any part of the world. The poorer the land, the less lime it will bear. But our best land will not admit of so much lime at two dressings, as I have understood they put on in England, at once. Whether our lime is stronger, or our climate less favourable to it, I cannot tell. A difference of climate may have an operation on plaister, as it has on products. Vegetation is here more rapid than that of England, and of course our harvests earlier. The straw of their wheat is, I believe, generally shortter than that on our fresh or manured lands, and the ears larger and fuller, where the wheat is good; for they are not without a due proportion of bad wheat with light and small grains. So that we do not generally get so much wheat off an acre as they do. But our wheat yields a greater proportion of flour. It is not so flinty, is thinner skinned, and of course we have less offal and more flour. Our grain grinds more lively, and without kiln drying. Much of their wheat requires kiln drying, before it can be ground to advantage, and especially grain intended for exportation; owing to its qualities, produced by moisture and other circumstances of climate. In Ireland their grain ground at their best mills, is generally kiln dryed. We know neither the necessity or use of kilns in our mills, except for Indian corn. On the contrary, our millers sometimes damp the wheat to prevent the bran from being ground so fine as to pass through the cloth and speckle the flour. This account is given to shew the effects of moisture in the English and Irish climate in comparison with that of our country. I believe that plaister will not answer so well in a moist, as in a

moderately dry climate. A very wet season here is not the most favourable to plaistered grounds. The advantages of the gyps over other manures are most perceptible in dry seasons. I doubt, however, be the effects of climate what they may, either on products or manures, whether in England the plaister has had a long or fair trial. I find, by some late English publications, that the knowledge of it is not extensive, and its use confined to few agriculturists; some of whom give the most flattering accounts of their success in its application.

Many of my fields are limed as highly as they will bear. Some part of my land is fresh; a small part remains in an exhausted state. I apply the plaister to all, and do not find any difference unfavourable to that which has been limed. Soms years ago I sowed clover with wheat in the autumn, on a field highly limed. I plaistered a part of this field, on the clover and wheat: the whole having had a light dressing of dung. The succeeding season the plaister threw up the clover in such profusion as to choak the wheat crop, in a great degree. I lost my wheat on the plaistered part, as I mowed, not being able to reap the crop. The wheat on the other part was excellent, and the clover of moderate growth. I am aware that part of my misfortune in the loss of the wheat, may be attributed to the clover getting too forward, by being sown at the season of feeding wheat. Yet a comparison with that in the same field not plaistered, sufficiently shewed the effects of the gypsum. I have not repeated this mode of sowing clover, which I then practised to avoid the loss I had sustained from late frosts, which sometimes destroy the young clover, sown on wheat in the winter.

Some farmers object to sowing plaister on the clover sown on winter grain, while the grain is in the ground; and do not strew the plaister till the next season. Perhaps this may be best. But I have met with no loss by strewing the plaister on the clover and wheat, when the clover seed was sown on the wheat in February. On the contrary, in a dry spring, it has saved my young clover, and forwarded the grass, so as to enable me to mow a tolerable crop in the autumn next after the wheat harvest, which, being cut with the stubble, I have given in the winter to dry cattle. What they rejected, increased my dung heap. It has been however most common with me to sow the plaister in the spring next succeeding the grain harvest.

Query 11th. Its duration?

Answer. When it throws up gentle and moderate crops, its efficacy is of the longest duration. If it is violent in its first operation, it is of short continuance. I have known it exhaust itself in one year. But I have had benefit from one dressing of three or four bushels to the acre, for five or six years, gradually decreasing in its powers. I prolong the efficiency of dung, by plaistering the second or third year, when the clover, on dunged or any other ground, begins to fail. Perhaps the scattering it annually, or every other year, in small portions, will continue for a length of time gentle operations, and prevent violent efforts. I have heard of some who have practised sowing it frequently, and in small quantities, and obtained good crops

of grass for twelve years and upwards.

The weeds of our fields, which have been at former periods under bad culture, forbid their laying in grass, especially if only pastured, so long as it would be otherwise desirable. Cutting annual weeds, before they seed, will destroy them. Perennials cut at proper periods. may in a great degree be conquered. At any rate, their seeding may be prevented; and the old stock destroyed by ploughing. But the abominable custom of suffering weeds, briars, &c. to grow in corners and about fences, will forever afford nurseries of these pests, which will keep up a succession of these nuisances, in fields otherwise well cultivated. The rotting of fences, articles of no small expense and labour, is not the least evil attending this negligent habit. The few farmers who are careful to destroy weeds in their own fields, are too often infested by those of their slovenly neighbours. In some parts of Europe there are laws which authorize those who destroy weeds in their own, to cut those in the adjacent fields of an obstinate or negligent neighbour, and obtain summary process from a magistrate, to reimburse the expense. However, unpalatable such laws might be here, they shew that the destruction of weeds is considered highly important, in countries where a good stile of agriculture prevails. The truth is, that a farmer should be in constant hostility against these formidable foes. His reward in a victory over them, will be a certain increase of his crops, which will be doubly benefited by every effort to destroy useless and noxious plants.

Query 12th. Is there any difference between the American and European plaister.

Answer. I have in general found the European plaister the best. But I have used the Nova Scotia. The quarries in Nova Scotia may turn out better, the more they are worked and explored. There is a variety in the American plaister, some being much better than others."

The prejudices for and against this manure are equally violent; and there is no way of correcting them but by the results drawn from sober and continued experience. In Germany, where this fossil has been the longest known and used, opinions have been very opposite, and many of them very absurd and ridiculous. Not only sorcery and witchcraft have been charged on those who used the plaister, but it has been said by some *wonderfully wise* people there, that it produced or attracted *thunder* and *lighting*. Some of the petty princes of that country have made edicts against the use of it, urged, perhaps, by the bigotry of its opponents, and the unfounded German adage: "That it makes rich fathers and poor children." The peasants have, however, in opposion to their weak and tyrannical prohibitions, sown the plaister on their fields in the night. I have seen a treatise in German, on the subject of gypsum, as applied to agriculture, containing many excellent observations and useful lessons, mixed with some anecdotes and discussions, sufficiently amusing to cheer one through dissertations, on a topic apparently insipid and unentertaining.

After all that our present experience enables us to say, we have

much to learn on the qualities and effects of the gypsum, as it relates to agriculture. It is a capricious and whimsical substance. I have known it produce no effect for four years, and then throw up a most astonishing vegetation, and this after repeated ploughings, for both winter and summer crops. In a field now in clover, I perceive it most luxuriant, where Indian corn hills were plaistered with no effect on the corn, four or five years ago. This is one among many instances I have had in my own fields, and have heard from other farmers of similar effects.

May not this be accounted for by supposing that the operative principle in the plaister was an over-charge for the fermentable substances then in the earth, and that it did not find enough of these substances to operate on, 'till the time when it produced the vegetation here mentioned?

Whatever be the cause, *dew* will remain on a part of a grass field plaistered, an hour or two in a morning, after all moisture is evaporated from the part of the same field not plaistered. I have also frequently seen this effect in my garden beds, which, if plaistered, will retain moisture in the driest season, where there is not the least appearance of it in those beds whereon no plaister was strewed. If water be, according to Lord Bacon, "*almost all in all*" in the food of vegetables, the plaister attracts or retains abundant supplies.

I do not like the plaister ground too fine. It flies away in strewing, and is not so durable as that moderately pulverized. I think it sufficiently fine if it be ground so as to produce twenty bushels to the ton. It is most common now to make twenty-four or twenty-five bushels of a ton. I have endeavoured to prevent the finer parts from being blown away, by damping it. But I do not find that it can, in this state, be so equally distributed; it being apt, when thus damped, to collect in lumps.

It should always be remembered, that *calcination*, however necessary it may be to make cement of plaister, lessens, if not destroys, its agricultural uses.

We have a simple mode of trying the quality of plaister. We put a quantity pulverized into a dry pot over the fire, and when heated it emits a sulphureous smell. If the ebullition (arising from whatever cause, be it the escape of air or dissipation of its water of chrystalization) is considerable, it is good. If it be small, it is indifferent. If it remains an inert mass, like sand, it is worthless.

It is customary with some farmers, to sow plaister every year on the same ground, in smaller quantities, that is about a bushel to the acre; and some sow less, for several successive seasons. Some sow it every other year. Those who practise these methods (by all of which I have occasionally profited) consider them most beneficial, for grass grounds particularly. I have generally thought it best to get abundant products in the shortest time. I have therefore applied the gypsum in greater quantities, to the clover husbandry; and its operations were in full vigour, as long as the clover continued on the ground. When the clover fails, I plough and proceed with the usual course of crops, till it falls again into its common rotation. This generally happens in the third year from my plough-

ing up the lay or sod, as it succeeds winter grain, which I have seldom sown on my worn lands, unless they are previously limed, or dressed with stable manure, or buckwheat ploughed in as a green dressing. I have sometimes ploughed in the last growth of the clover, of the second or third year, and harrowed in on the sod, after once ploughing, wheat or rye, on which I have sown clover-seed, and plaistered again. I have done well enough in this practice, though I do not think it neat or good husbandry. It should not be done if the ground be poached, or foul with weeds or blue grass, which require frequent ploughing to destroy them.

I sow clover with spring grain generally, and scatter plaister on the clover and grain, but doubt its effects on the grain as a top dressing*.

I often sow clover seed with plaister on buckwheat, and the plaister operates powerfully on both clover and buckwheat. Clover seed sown on flax, answers well. The plaister has a great effect on both these plants. The pulling the flax does no injury to the clover. If the buckwheat seed be wet, and strewed over with a coating of plaister, the crop is much benefited. I sometimes mix the clover seed with the plaister, and sow them together.

There are various opinions as to the manner and time of plaistering Indian corn. If the season and other circumstances are favourable, the mode then used is naturally conceived to be the best. But there is no deciding from one or two fortunate seasons. Some put it on the hill soon after, or at the time of planting; some at the time of moulding; and others at a later stage. Some suppose that if it be put on, and could be confined to the plant (though this is impossible, for the earth will receive the greater part, either while it is strewing on the plant, or by the washing of rains), it is the most beneficial. I generally strew it on both plant and hill, when the corn receives its first dressing. I have put it on the hill only, and have scattered it over the whole field. I have met with success generally, but sometimes disappointment, in all these modes of application. The one I generally practise is strewing it on the plant and hill, when the leaves are fairly formed; or at the latest when the corn receives its first dressing, which is most commonly done by harrowing over and uncovering (if necessary) the plants, though the hoe is used when requisite. But the plaister is always strewed after this operation, that it may remain on the surface.

I have always considered it necessary to keep the plaister, as much as possible on the surface. In some anomalous instances, which I consider as exceptions to any general rule, it has operated when ploughed in; but for the most part it does best as a top dressing. I had been informed of a practice of sowing plaister with seed wheat, and ploughing both in together. This (and every other mode of application of the plaister to winter grain) has had little, if any success with me;

* Mr. W. West of Upper Derby, informs the Editor that in Loudon county, Virginia, evident advantages are derived from strewing one bushel of gypsum on an acre of wheat, early in the spring.

though I have tried it in every way I ever heard of, or could imagine.

Good crops of winter grain have often succeeded clover, to which no other manure than plaister on the clover, had been applied. I attribute this to no immediate action of the plaister on the grain, but to the clover, which always ameliorates the soil. It is an excellent covering crop, and, like most tap rooted plants, does not exhaust; but on the contrary, increases fertility. I have known a good crop of wheat follow the ploughing in a luxuriant vegetation of young succulent teazle and thistles...tap rooted plants. These apparent pests had for several years occupied the field. They had operated as a cover, and, when ploughed in, as a green manure.

The lot on which I first strewed plaister, twenty-five years ago, has not been ploughed during that period. I have twice given it about half a top dressing of stable dung. I have repeated the plaister three or four times, three, four, and six bushels to the acre, at intervals of three, four, and five years. I should have preferred ploughing, had it been convenient, as, in the second crops, I am often tormented with Indian grass and weeds. But the ground is on a part of my farm, where the hay and pasture are more useful to me than any other crops. After dressing with dung, I have left a part unplaistered, to compare it with the rest; and always perceived a striking inferiority, where the plaister was not strewed. I once repeated the plaister on a part of it, without previously dunging, after it had been mowed several years, from the time it was first plaistered. The plaister seemed to have no effect. But on applying a slight dressing of dung the next year, this part was equally good with the rest. This lot is now an excellent common grass, intermixed with red and white clover, and some blue grass....parts of it much layed, owing to the wet season. I have, notwithstanding the above instance, frequently plaistered here and in other parts of my farm, and succeeded well without dung; but never in the degree I have perceived with dung. I must be understood here to mean, a repetition of the plaister. For in the first application it has generally thrown up as great a burthen as any combination could produce.

I have from this and many other occurrences, long been of opinion that the plaister must come in contact with some animal or vegetable manures, or putrified substances, to give it its proper efficacy. And when so connected, a small quantity of such manures or substances, will give it activity. The auxiliaries necessary to draw forth the powers of the plaister, are within the reach of every farmer, of common industry and moderate capacity. The first application, without other assistance than what it finds in the earth, from the decayed and decaying roots, and other vegetable substances, will throw him up forage, and enable him to increase his stock. The more stock, the more animal manure for summer or winter crops, preparatory to the repetition of plaister, with clover. The green manures only cost the seed which produces them. With these auxiliaries, I am satisfied, by actual

and long experience, that the gypsum may be repeated as safely, and with more benefit and less expense, than can any other manure, *on soils suitable for its application* ....a circumstance which ought always to be kept in view. I can with a tolerable degree of certainty, from the appearance of an over luxuriant crop of clover, tell when it is about to quit me. When the plaister ceases its operation, the clover departs with it, being overcome by twitch or other noxious grasses or weeds. It perishes in consequence of two violent and rapid efforts, its fate is similar to that of an individual, who by living too fast, accelerates death. I account for the phenomenon of the sudden exit of the operative powers of the gyps, by its having prematurely decomposed the substances containing the principles of vegetation; and having exhausted those principles in too short a time. In the violence of these operations it excites a vigorous, but fatal vegetation, which, like the exertions of one in a proxism of fever, puts on the semblance of strength, but in fact is only a prelude to dissolution. There is no guard against this misfortune, but the practice of sowing small quantities, and frequent repetition. This mode I like the better, the more I experience it."

Valuable however as gypsum is, it must be acknowledged not to be suited to all soils and situations.

1. Mr. JOSEPH COOPER strewed some upon his clover shortly after the revolutionary war, with evident good effect upon the first crop, but he had a trifling second crop. He then put the land in potatoes after ploughing and manuring well, and tried clover again, but the crop was not worth noticing; flax, which according to his experience answers as well as barley with clover, was tried the succeeding season, the ground having been previously well manured, but with no better effect. He then hauled river mud upon his land, and this seemed to have the best effect in adapting the soil to the growth of clover.

It is highly probable that the cause of the exhausting quality of the gypsum in the above instance, proceeded from the small quantity of vegetable matter it found in the ground, as explained by Mr. PETERS; or the gypsum may have been of a weak kind.

Mr. SAMUEL COOPER, also of New-Jersey, experienced no benefit from gypsum applied to corn, in a *sandy* soil: though we have before seen, (Art. CORN) that good effects were produced by it in Pennsylvania.

2. Gypsum, it is well known, does not answer near the sea. Dr. MITCHELL explains this circumstance thus: "When plaister is applied to a soil impregnated with common salt, a double decomposition may happen; the sulphuric acid forming with soda a Glauber's salt, and the muriatic acid making with the lime a muriate of lime. As neither of these substances is remarkable for promoting the growth of vegetables, the reason is plain, wherefore gypsum so often fails to fertilize land in the neighbourhood of the ocean, or in any place where it can be decompounded by particles of sea salt."

3. On clay it is equally inert.

Mr. SMYTHE, in the *Trans. of*

the Board of Agriculture, *London*, has published some observations on gypsum which evidence great want of information on the subject, and shows that the right use of this invaluable manure is much better understood in Pennsylvania.

Mr. PETERS, has fully refuted the errors of the above writer.]

H.

HADDOCK, or *Gadus eglesinus*, L. a species of fish which periodically frequents the Yorkshire coast, in large shoals, and commonly weighs from two to three pounds.

Large Haddocks are in roe, from the middle of November to the end of January; but, in the succeeding three months, they are said to be out of season. In the month of May they recover their flavour, and continue to improve till January, when they are in the greatest perfection.

These fish grow to a considerable size, weighing sometimes fourteen pounds; but in such case their flesh is coarse, and not proper for the table: hence those of an inferior bulk are more esteemed when their weight does not exceed two or three pounds.

HAIL, a meteor, which is usually defined to be frozen rain; though it widely differs from the latter, as hail-stones are not composed of single pieces of ice, but of several small globules condensed together.

Hail is one of those phenomena, of which naturalists have in vain endeavoured to give a satisfactory explanation. As far as the limits of our knowledge extend, hail is a meteor, that is never productive of any good effect. Both rain and dew invigorate the whole vegetable world; and the frost, by expanding the water contained in the earth, often pulverizes and renders the soil fertile; while the snow shelters the more tender plants from being injured by severe frost. Neither of these purposes is effected by hail, which is indeed attended with contrary effects: for, during the winter, it does not lie sufficiently close to the ground, to preserve vegetables from the nipping frosts; and, during the spring and summer seasons, its cold temperature not only chills and blasts, but its weight greatly injures the more delicate plants; frequently laying whole corn-fields level. But though we cannot discover any ostensible use of hail, it is certain that the Creator has formed nothing, that is not in some degree subser-

vient to the operations of Nature.

HAIR, small filaments, which issue from the pores of the skins of animals, and which serve them as a natural covering.

Hair is found on all parts of the human body, excepting on the palms of the hands, and the soles of the feet; but it grows to the greatest length on the head and chin. It is subject to few diseases; the only affection that can in this country be strictly considered as a disease, is BALDNESS; for which we have pointed out the most proper remedies.

Frequent cutting the hair is very beneficial to the ears, eyes, nay, to the whole body: and, if the head be washed or immersed daily in cold water, it will be found an excellent preventive of periodical head-achs.

Persons subject to defluxions of humors from the head, to weak eyes and similar complaints, will derive great benefit from shaving the head at certain intervals; as this is the most effectual mode of opening the pores and promoting perspiration. There is no danger of contracting *cold* from washing or exposing the head, after being rubbed dry, to the open air: and this futile objection should influence only the conduct of those who, from ignorance or prejudice, carry all their exhaled impurities on the surface of the skin, and especially on the head, for a succession of years. Thus, perhaps, arise many states of intellectual derangement, the source of which is seldom suspected. Besides, cleansing the head affords comfortable and pleasing sensations; and the more frequently the hair be cut, it will grow the more speedily; so that this simple expedient may, in some measure, serve as a substitute for a constant blister, or artificial issue.

There are, however, certain cases, in which cutting off the hair is attended with dangerous effects, especially during a state of convalescence from acute diseases. In a periodical work lately published in France, two instances are related of women, in a very promising state of recovery from a putrid malignant fever, whose hair had been cut, and who both died shortly after this imprudent action. A third owed her preservation only to her youth, and the energy of her constitution.

The hair is, by all nations, considered as an ornament to the person, more than as a covering for the head, provided by the beneficent hand of Nature. Hence various pomatums, and other secret preparations, have been imposed upon the public, for the purpose of "making the hair grow long and thick." We are no advocates for contrivances, which to our certain knowledge are generally composed of noxious ingredients, such as the calces of lead and mercury. Those persons who cannot be dissuaded from the use of artificial means, may with safety employ a mixture consisting of equal parts of olive-oil and spirits of rosemary, to which may be added a few drops of oil of nutmeg. If the hair be rubbed every night with a little of this liniment, and the proportion be very gradually increased, it will answer every purpose to be attained by those boasted preparations which are sold by empirics.

Another course of fraud is that of changing the colour of the hair

to a darker shade: with this intention, various liquid remedies are vended by perfumers, under different alluring appellations. These, however, being likewise prepared from lead, antimony, and other metallic solutions, no prudent person will be induced to purchase them. The only method that can be pursued with impunity, is to cut the hair close to the head, and to pass a leaden comb through it every morning and evening, by which simple practice the hair will assume a darker colour; the perspiration of the head will not be impeded, and, consequently, the health of the individual rather promoted than injured.

Hair constitutes a very considerable article of commerce, especially since the fashion of wearing wigs has prevailed among all ranks, and has lately been extended to both sexes. The hair of this, and other northern countries, is preferred to that of the southern climates of Italy, France, &c. The chief quality of hair consists in its being *well fed*, as it is termed by hair-dressers, so that it be neither too coarse nor too slender. Hence thick hair is less susceptible of the artificial curl, and is disposed to frizzle; but, if it be too delicate, it will retain the curl only for a short time. The length of good hair is usually estimated at 25 inches; and, in proportion as it is shorter, it becomes less valuable. There appears to be no stated price for this article; as, according to its quality, it is sold at from 5*s.* to 5*l.* per ounce: it pays, when imported, a duty of 2*s* 4½*d.* per lb. With respect to the various operations which hair undergoes previously to being manufactured into wigs, we trust the reader will excuse our silence.

The hair of beavers, hares, and other animals, is used in various manufactures, especially that of hats, of which they constitute the principal material.

If the refuse of the short hair of hides be scattered on arable land, and left there to putrify, it proves one of the most fertilizing and durable manures.

Hair, *in farriery*, is commonly called the *coat*; and, with respect to horses, merits particular consideration. The hair growing on the fetlock, serves as a defence to the prominent part of it, when the animal is travelling on rough, stony roads, or in frosty weather. If the hair on the neck and more exposed parts be close and smooth, it may be concluded that the horse is in health.

To render the hair of this useful animal fine and glossy, it is necessary that he be kept *warm at heart*, as the least internal cold will render the hair rough; he should also be frequently sweated, in order to loosen the dust and filth, which render his coat foul; and while he is hot, all the white foam, sweat, &c. that rises on his skin, ought to be carefully scraped off. The smoothness of a horse's hair, it is said, may also be considerably promoted, by rubbing his own blood over him for two or three days after it has been drawn; he is then to be well curried and dressed, in consequence of which, his coat will become as soft and glossy as if it had been covered with a fine varnish.

The hair of a horse's mane and tail is apt to fall off, especially if they have been suddenly over-

heated, so as to engender, what is called in the language of the stable, the *dry-mange*. A similar effect will follow, after he has been surfeited, so that the foul humours are repelled into those extremities of the body. To remedy such disgusting appearance, the horse's mane, &c. should be anointed with black soap, and the animal washed with a strong ley prepared of wood-ashes. If, nevertheless, a canker arise on the animal's tail, it will be requisite to apply diluted oil of vitriol, which will corrode, and prevent it from making farther progress.

Horse-hair likewise forms a considerable article of trade; it pays on importation a duty of about 11*d*. per lb. and is partly employed for weaving the covers of the seats of chairs, sofas, &c. but principally for the stuffing of bolsters and mattresses. For the last mentioned purposes, the hair is previously baked, and, in that state, forms one of the most elastic couches, which is incomparably superior to the softest, but enervating, feather-beds.

HAIR GRASS, or *Aira*, L. a genus of perennial plants, comprising 24 species; of which 14 are indigenous; and of these the following deserve notice.

1. The *cespitosa*, or Turfy Hair-grass, which grows in moist meadows and woods; flowers from June to August. This plant is frequently found in tufts, and occasions irregularities in the surface of meadows. It produces an abundant quantity of leaves; and being the roughest and coarsest of all the grasses in pasture and meadow-grounds, cattle seldom touch them unless impelled by hunger. It would, therefore, amply repay the trouble of eradicating it, and substituting better grasses: for this purpose, the land should be first drained, and then the tufts of this noxious weed pared up and burnt. Its ashes are said to afford an excellent manure. Cows, goats, and swine eat the turfy hair-grass, but it is refused by horses.

2. The *flexuosa*, Heath or Waved Mountain Hair-grass, growing on heaths, in woods, and barren pastures; and flowering from June to August.

3. The *caryophyllea*, or silver Hair-grass, which is common in sandy pastures; and flowers in the month of July.

Mr. STILLINGFLEET, in his excellent *Tracts relating to Natural History*, recommends the culture of both these last species, as being particularly well adapted for sheep-walks: for he has observed them always to abound in those counties which are celebrated for delicious mutton.

4. The *aquatica*, or Water Hair-grass, is found generally on the edges of pools and standing waters; it flowers in the months of June and July. This plant is a wholesome food for cattle, and deserves to be more generally known; as it contributes much to the sweetness of the Cottenham cheese, and to the fine flavour of Cambridge butter.

HAIR-POWDER is generally prepared from starch, which, after being thoroughly dried, is ground and passed through the finest sieves. In its pure state, it should be perfectly white, and possess no smell. But in order to conceal base adulterations, or to please the votaries of the *toilette*, perfumers

study the art of communicating to it various artificial odours from sweet-scented flowers, such as violets, Jesamines, &c.

Dr. DARWIN observes, that *alum* is sometimes used in the manufacture of hair-powder; and we understand from credible persons, that even *lime* is frequently mixed with fine flour: it is therefore not surprising that so many persons who employ hair-dressers display bald heads, and are under the necessity of wearing wigs, but, if the latter were aware of the injury they inflict on themselves, by inhaling such pernicious substances, in consequence of which, many who exercise that trade, pine away of pulmonary complains, they would never use any other but genuine powder. And though common flour is not in itself pernicious, when used as a substitute for hair-powder, yet by the mucilage it contains, the hair is apt to be caked together when the head is sensibly perspiring, or is accidentally wetted by a shower of rain; an effect which may be frequently noticed in a whole regiment of soldiers.

There is a great variety of vegetables which may be usefully employed as substitutes for hair-powder, in the manufacture of which large quantities of grain are annually wasted. The principal of the former is, we believe, the HORSE-CHESNUT, of which the reader will find some account, vol. ii. p. 113. See also STARCH.

HALTER-CAST, in farriery, is an excoriation of the pastern, occasioned by the halter being entangled about the leg, in consequence of the horse's endeavour to rub his neck with one of the hind feet. For the cure of this affection, it is requisite to anoint the sore part every morning and evening with equal quantities of linseed oil and brandy, properly mixed.

HALTING, among farriers, signifies an irregularity in the motion of a horse, arising from a lameness, or other injury in the shoulder, leg, or foot, which induces him to spare that part, or exert it too timorously.

As an intimate acquaintance with this defect is of considerable importance to the farmer, we shall briefly state the principal circumstances connected with the subject.

If a horse *halts*, the lameness may be discovered either *before*, in which case the malady is seated in the shoulder, legs, of feet; or, *behind*, when it lies in the hip, ham, &c.

1. When the cause of the affection proceeds from the *shoulder*, the horse does not lift up his leg, but drags it on the ground, or casts one of them more than the other, and keeps the knee in a manner unbent. On turning short, he will evidently favour the lame leg.... Hence the injury must be either in the top of the shoulder blade, called the *withers*, which is known by the animal *halting* most when a person is on his back; his frequent shrinking; and, if pressed with the hand about the top of the shoulder-blade, attempting to bite; or, the hurt may be at the lower end of the shoulder-blade; in which case he treads with *thick steps*, shrinks, and is ready to drop on being squeezed in that part.... When it arises from the elbow which joins the marrow-bone to the leg, the horse winces, and

draws up his foot, on slightly pinching the part above mentioned.

2. If the lameness be in the *legs* (in which case it is in the knee, or pastern joint,) the horse refuses to bend either the one or the other, and walks stiffly on that leg; or, when it appears in the *shank*, it will be discovered by some splint, screw, windgall, or other visible malady.

3. If the defect be in the foot, it is either in the *coronet*, and proceeds from a strain: or it becomes evident by a hot and inflamed tumor. Or, if it be situated in the *heel*, it may have been occasioned by an over-reach, which is discernable by the eye, as well as by the animal's treading entirely on his toe. When a horse halts more on sloping than on plain ground, the mischief is seated between the *quarters*. This kind of limping is sometimes occasioned by being pricked with a nail in shoeing; in which case, the offensive nail may be distinguished by pinching the head of each together with the hoof.

Should a horse *halt behind*, from a disorder in the hip, he will walk side-long, and not follow so easily with that leg as the other; nor will he turn on the side affected, without favouring the leg. This cause of lameness is particularly discoverable when the animal, in walking on the side of a bank, lifts up the injured leg higher than the other. Like all injuries of the hip joint, that last mentioned is most difficult to be cured; and, in every species of the affections before described, total abstinence from hard labour, proper feeding, and according to circumstances, either moderate exercise or complete rest are essential requisites to a speedy recovery.

HAM, the lower part of an animal's thigh, adjoining to the knee; or the angle in which the leg and thigh, when bent, incline to each other.

HAM, in Commerce, denotes the thigh of a hog or bear, dried, seasoned, and prepared so as to preserve it.

Hams may be cured, in order to resemble it taste those of *Westphalia*, by the following process: Cover a young ham of pork with dry salt, let it lie for 24 hours to drain off the blood, then wipe it perfectly dry, and take one pound of brown sugar, a quarter of a pound of saltpetre, half a pint of bay salt, and three pints of common salt; incorporate these ingredients in an iron pan over the fire, and stir them continually till they acquire a moderate degree of heat......In this pickle the ham must be suffered to remain for three weeks, frequently turning it, when it should be suspended in a chimney for drying, by means of smoke from no other but a wood-fire. See also vol. i.

[Hams may be cured by Pocock's receipt for curing beef:..... See vol. i. p. 250.]

HAMAMELIS: Witch hazel. There is only one species of this natural plant, viz. *Virginica*.

The Indians consider this tree as a valuable article in their materia medica. They apply the bark, which is sedative and discutient, to painful tumors, and inflammations. A cataplasm of the inner rind is found to be very efficacious in removing painful inflammations of the eyes, according to Dr. CUTLER. *Amer. Acad. Mem.* 1. Mr. BARTRAM informs the Editor that "this shrub grows ten or twelve feet high from one common root, producing blossoms late in the au-

tumn, and in mild winters, through almost all the season, and exhibiting a singularly pleasing appearance; for, then divested of its foliage, the twigs appear fringed in gold. Brooms are made of the poles of this plant."]

HAND, a part or limb of the human body, which forms the extremity of the arm.

The most common accidents to which the hand is liable, are *sprains* from violent exertion, and *chaps* from sudden changes of heat and cold.

When the hand has been sprained, Dr. Lobb recommends fomentations with vinegar for several minutes, and two hours after every applicatian, the part affected should be wetted with rectified spirit of wine, and then gently rubbed.... We believe, however, that of all the emollient remedies, goose or duck's fat is productive of the best effects, if the hand or arm be kept at rest for some time in that posture, in which it was when the accident happened.....See farther, Sprains.

For the cure of *chapped hands*, there is no better and more simple remedy than honey-water, if suffered spontaneously to dry, when it forms a kind of varnish, which speedily allays the pain and heals the skin. For the prevention of this complaint, it will be useful to observe, that the hands should never be held to a fire after returning from the cold air; and, after every washing, they ought to be carefully wiped and dried.

Hanging: See Suspension by the Cord.

HARE, the Common, or *Lepus timidus*, L. is naturally a timid animal, and extremely swift in motion, when pursued by dogs.

Hares are dispersed over almost every climate, and, though hunted in all countries, their species does not apparently diminish in number. They breed in the first year, and the female generally produces four or five leverets, after a gestation of about thirty days. Unlike dogs, the eyes of these animals are open at their birth; and, after being suckled for about three weeks, they are abandoned to their own fate.

Hares are remarkably infested by fleas...According to Linnæus, the Dalecarlians manufacture a species of cloth, or felt from the fur of this creature, which, by attracting the insects preserves the wearer from their troublesome attacks. Hare's wool forms an important article in the manufacture of hats; and pays, on importation, a duty of only 1*s*. 10*d*. per lb. as sufficient quantities of it cannot be procured in Britain.

Hares are of a gentle disposition, susceptible of a kind of education, and, if taken very young, may easily be domesticated. They attain the age of about seven or eight years, and their proper food is grass, cabbages, and other plants. Sow-thistle, dandelion, and lettuce, are to them peculiarly agreeable.

These animals frequently inflict great injury on trees, by barking them. Beside the hints already given, for the prevention of this mischief, we learn from M. de Ehrenfels, a German writer, that trees may be effectually secured from their depredations, by anointing the bark in autumn, several feet high, with hog's-lard, and sometimes also besmearing them with ox-gall. Another remedy, which appears to be more efficacious, and salutary rather than hurtful to the vegetation of the

tree, consists in scattering occasionally small quantities of soot round the stem: this expedient has for many years been successfully practised in Scotland.

In order to prevent hares from devouring the young cabbage or brocoli, and other succulent plants, it has been recommended to dip their *roots* in the following preparation, before they are transplanted: Take the parings of old cheese, soak them in water, and preserve it till spring: then stir into the liquor such a quantity of clay as will form a pulpy mass. We have had no experience of this medication; though it is affirmed, that it not only secures the future plants from the attacks of hares, but its exhalations are so abnoxious to those depredators, that they will not frequent gardens where vegetables thus prepared are growing.

With regard to its physical properties, the flesh of hare is more palatable in winter; and those bred in elevated countries are most esteemed. Nor should this animal be chased till it drops; for thus the flesh is rendered less digestible, and less wholesome: in other respects, its qualities are similar to those of DEER.

HARROW, an implement of agriculture, commonly used for the purpose of covering seed with earth. There is, however, another object, to which it may be applied, of equal importance, namely to pulverize the soil previously to its receiving the seed.

Common harrows are of different forms. That first we shall notice has two bulls, four feet in length, and eighteen inches apart, each of which is furnished with four wooden teeth. The second has three bulls, provided with twelve similar teeth: a third has four bulls, and twenty teeth, composed generally of iron, which are ten, eleven, or twelve inches apart. The last mentioned implement is preferable to either of the former; as, on account of its iron teeth, it is better calculated for covering the seed; but it is still very imperfect, and the use of it attended with many inconveniencies. Hence different harrows have been invented at various periods, the principal of which we shall describe in the order of time.

The earliest that merits notice is the *Harrow-plough*, invented in the year 1763, by a Mr. WOOD, of Chelmsford, Essex: a full account of which appears in the 2d vol. of the *Museum Rusticum et Commerciale*. It consists of a common harrow-frame, 7 feet in length, and 4 in breadth, to which are fitted 14 iron shares, of the form of a heart, with a rounded point, being hollowed underneath, and convex on the upper surface: the edges of the rounded point, and two sides of these shares, are sharpened in the same manner as a common hoe; and the shares are disposed in the following order; the letter A representing the front, and B the back of the frame.

A

1			4			7
	2	3		5	6	
	9	10		12	13	
8			11			14

B

The design of this implement is to clear turnips from weeds, &c. Each share is about 14 inches distant, and, when the harrow-plough moves forward, the shares marked 1, 4, 7, are the first, each of which cuts the plants or weeds in its way. These are succeeded by others marked 2, 3, 5, and 6, which toge-

ther form seven shares. The seven remaining behind are intended to complete the work commenced by the first row. Thus each share clears about eight inches of land in width, and leaves the space of six inches untouched. This method of weeding turnips has been found much cheaper and more effectual than the common practice: for the shares cut deeper, and move the ground better than labourers will stir it with their hand-hoes. Besides, the harrow-plough, it is affirmed, will also bring land to an excellent state of improvement, after it has been three or four times ploughed.

In the year 1795, a harrow upon a new construction was invented by Mr. EDWARD KNIGHT, of Great Bardfield, Essex, for which the *Society for the Encouragement of Arts, &c.* in 1796, conferred on him a premium of 15 guineas. The purpose of his contrivance is to obviate the irregular motions, sudden and incessant checks, and various other inconveniencies attending the use of the common harrows.

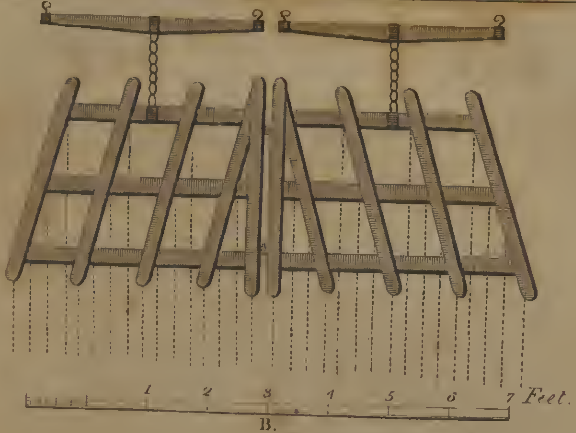
[This harrow consists of too many parts to be generally adopted by farmers, who require simple, strong, and cheap utensils. The account therefore given of it by Dr. WILLICH, is omitted.]

In the "*Letters and Papers of the Bath and West of Eng. Soc.* vol. 6." is an account of an implement, invented by the Hon. Mr. R. SANDILANDS, and denominated by him a *Chain and Screw Harrow*, of which we have annexed [a plate.]

If the ridges be high, and require to be harrowed through their whole length, that object will be effected by Mr. SANDILANDS' implement; as by lengthening the chain (which is commanded by the screw) the harrow, when drawn along, will form an angle downwards, and thus pass over every part of the curve of the ridge in proportion to its extent; which, according to his statement, may be *nine* feet, the distance from A to B; whereas the whole extent from *c* to *d*, is said to be only about *five* feet and a half. When the crowns of the ridges have been sufficiently harrowed lengthways, the chain may be shortened by the screw, which forms an angle upwards: the harrow is then drawn by horses, one on each side of the furrow, which will be completely reduced as well as the sides of the ridges, if 18 feet in breadth.

If the harrow is to be drawn across even ground, or high ridges, in such cases, it may, by the aid of the screw, be made horizontal, so as to work in the manner of a solid harrow without a joint. The teeth of Mr. SANDILANDS' implement are square, and fixed in the usual way, being nine or ten inches below the wood, and of such strength as the land may require. They cut or tear the ground regularly every four inches, without clogging, unless at the extreme angles, where the teeth are necessarily put somewhat closely together: they may, however, be cleared with the utmost facility, by raising them a little from the ground. The figures 1, 2, 3, 4, &c. point out where the twelve teeth on each side of the harrow are placed.

Mr. SANDILANDS observes, that where a strong break harrow is not necessary, by making the teeth shorter or lighter, 48 tines may be obtained, which will tear the ground at every two inches, cover the seed well and make a fine mould. He farther recommends to cons-



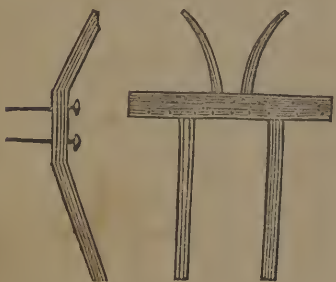
Mr. Wynne's Harrows.

Mr. Sandilands' Harrow.

Hay Harrow.

truct harrows for every purpose, and of every size, on the principle above stated; as, in such case, no tooth can follow the track of another, and all are kept in constant action.

The same gentleman has also invented another implement, called a *Wrack-harrow*, from the speedy manner in which it collects the wrack, or roots of couch-grass, and other noxious weeds. Of this contrivance the annexed figures represent the plan and profile.



It is composed of a plank of timber, six feet long, nine inches broad, and two inches thick, in which are fixed two rows of teeth, viz. twelve in the front, and thirteen behind: each row is about four inches apart, and the teeth are five inches distant; so that they operate at the distance of 2½ inches from each other. They are in length about seven inches below the wood, three-quarters of an inch square, and pointed diamond-wise, so as only to catch whatever may be brought above ground by previous harrowing, without penetrating the soil. To the plank are joined shafts for a horse, and handles for a man to guide it, of such length and strength as may be deemed necessary.

This machine is used in the following manner: When all the weeds are brought to the surface, the wrack-harrow is drawn across the field; the person who holds the handles pressing a little on them, till the plank has passed over the first furrow, on which the harrow is suddenly lifted, without stopping the horse; thus all the weeds collected by the harrow will fall into the furrow, whence they may be removed or burnt, at the option of the farmer. If, however, the horse be not steady, it will be requisite to employ a boy for the purpose of leading him; in order that the couch-grass, &c. may be properly eradicated.

A patent was granted in the year 1799, to Mr. William Lester, of Yardley-Hastings, Northampton, for his invention of a harrow, by which the inconveniencies attending the implements constructed on the common plan may be effectually obviated.

The patentee makes his harrows of various sizes, to be drawn by one, two, four, or six horses, so as to suit every kind of soil. The first size is six feet in width, and of equal length; the teeth are twelve inches distant in every direction, and there is an interval of one inch and a half between their tracks, in every line of draught. This size is more peculiarly adapted to harrowing in every species of grain and seed, especially on *lay*, *flag*, or *whole-land*. The second size is 7½ feet wide, and six feet nine inches in length; the teeth are fourteen inches asunder in every direction, and an intermediate space of two inches occurs between their tracks, in each line of draught. This implement is particularly calculated for clearing foul land. The third size is nine feet in length, by seven feet nine inches in breadth; the teeth are sixteen inches apart in

every direction, and a space of $2\frac{1}{2}$ inches intervenes between the tracks in each line of draught.... The last mentioned harrow is, in the opinion of the patentee, eminently adapted to the cultivation of foul land, especially for clearing *fen-fallows* of couch-grass.

The superiority of Mr. LESTER's patent harrow, is stated to consist in the impossibility of its clogging, or driving the soil together in heaps. Being divided into two parts, of equal lengths (which are drawn by two centres united in a third), it has a steady uniform motion, and is effectually prevented from diverging into any oblique direction. Another excellence in this contrivence is, its *couching* over both ridges and furrows, and its yielding to all the inequalities of the soil; besides, from the diagonal position of the bulis, and the irregular arrangement of the teeth, each tine is drawn in a different direction, so that no one tooth can follow another in the same track; whereas, in the common harrows, one half of the teeth run in the same course.

In the 9th volume of the *Letters and Papers of the Bath and West of England Society*, there is a description of a pair of harrows and of a drag, or heavy harrow, invented by Mr. H. WYNNE. His implements are constructed in such a manner, that each pin makes a separate track, and that the intervals between those tracks are all equal; so that the entire ground, over which the harrow passes at one time, will be marked with lines three inches apart. The pair of harrows is seven feet six inches broad; and the inventor asserts, that the same horses will, by means of it, work one fourth more ground, and perform such labour much better, than by any other harrow. Mr. WYNNE's implement is stated to possess this farther advantage, that when the pins or teeth sink into the earth, the posts being nearly parallel to the line of draught, admit all roots, stones, and other obstructions to pass freely between them, and also beneath the rails, by which they are connected. And, as the hinge is within the tine, when the harrow is drawn up and down ridges, it accommodates itself to the shape of the ground; the joint rising when the harrow is on the top of the ridge, and sinking when it is in the furrow.

The drag, or heavy harrow, likewise invented by Mr. WYNNE, is constructed without a joint, and will work a piece of land six feet three inches in breadth, leaving intervals of five inches between the tracks. The principle is similar to that on which the implements just described are formed; and which, the inventor says, is applicable to harrows of any size: as the intervals between the tracks may be varied at pleasure, the regularity being still preserved. The spikes or teeth here employed are made of square iron, pointed and bent forward diagonally; they are fixed in such a direction, that the line of the track may pass through their angles [as in the plan.]

A patent was granted in May or June, 1801, to a Mr. WILDE, for a harrow on a new plan. His invention is intended to obviate the inconveniencies attending the common harrows; from the ingenuity and simplicity of its construction, it appears to merit attention. The set of harrows, when put together for work, consists of four, which are constructed in the usual manner, and with the usual number of tines. These are placed nearly

parallel to each other, and are combined by means of three iron links, which are moveable where they are joined to the harrow; the centre link is fitted in an oblique direction, and is longer than the other two, which are set straight. All the links, however, are placed loosely, in order that the implement, when joined together, may have a little *play-room*. This ingenious harrow is fastened to the *bearing-bar*, to which the traces are affixed, by means of an iron pin that is attached to the chain-hook, passing through holes made at different distances in the bar, so as exactly to give the requisite direction to the harrow. Thus, the equal course of the implement is secured; and the work is more uniformly performed, and with a greater degree of regularity.

Mr. Wilde makes harrows for *five-yard* lands, exclusive of the furrows; but they may be adapted to any size required. The horses may likewise be set to draw abreast, or where the soil is very wet and heavy, to follow each other in the furrow, and thus to prevent the land from *poaching*. The patentee is of opinion, that a considerable saving might be made both in seed, and the labour of horses, three of which are said to be fully sufficient, where other harrows require four. His implement may also be employed as a rake, or for any similar purpose.

From the great importance of harrows in tillage, we have been induced to extend this article to a considerable length. Although we do not pretend to decide on the relative value and practical utility of the different inventions or improvments before specified, yet we should probably select the implements, contrived by Mr. Sandilands, without prejudice, however, to the merits of the rest, which are doubtless calculated to be eminently useful in different soils and situations.

HARTS-HORNS, are the horns of the common male red deer.... The scrapings, or raspings, of this animal's horns are medicinal, and employed in decoctions, ptisans, or cooling drinks, &c.

Harts-horn jelly is remarkably nourishing and sometimes given in cases of diarrhœa: a decoction of burnt harts-horn in water is, however, generally substituted for this purpose.

The coal of harts-horn, which is prepared by exposing it to a strong and long continued fire, changes into a very white earth, called *calcined harts-horn*. It is employed medicinally as an absorbent, and likewise in dysenteries, which are supposed to arise from acrid and ill digested matter.

The salt of harts-horn is sudorific, and has been successfully prescribed in fevers: it yields a very penetrating spirit, which is useful to persons of weak nerves, or subject to fainting fits; though the preparation generally used, is distilled from bones, after extracting the oil. The latter is more grateful to the stomach, retains its limpidity for a much longer period, and is consequently superior to that obtained from harts-horn. This valuable substitute, however, is frequently adulterated by means of quick-lime. In order to detect the fraud, let a small portion of strong spirit of wine be mixed with the suspected volatile spirit; and, if a white powder be separated, let it subside, till the fluid can be decanted. A little of the sediment

is then to be poured into a spoon, and held near a fire, or over the flame of a candle: if the powder be completely dissipated, the spirit is not prepared with lime, and contains a due proportion of volatile salt; but, if any remain in the spoon after it has been exposed to a moderate heat, it may be concluded that quick-lime, and other pernicious ingredients, have been employed.

[The utility of the spirits of harts-horn, or spirit of sal-ammoniac in curing the effects of the *bite of a snake*, were mentioned in vol. i. p. 44. The efficacy of the remedy has lately been confirmed by a publication of Dr. RAMSEY of Charleston, S. C.]

HASEL. See HAZEL-NUT TREE.

HAT, a covering for the head, which is generally made of a mixture of Spanish wool with that of hares, kids, rabbits, beaver, &c. Lately, feathers have been usefully employed in the manufacture of this article.

As it would be too tedious to detail the various processes the different materials undergo, before they are converted into *felt*, we shall content ourselves with observing, that the degree of fineness depends entirely on the greater or less quality of hare's wool and beaver employed in its texture. The former is usually mixed with equal portions of the finest sheep or lamb's wool; but the beaver is generally confined to the facing of finer hats, into which it is worked superficially, and therefore seldom used for the body, or principal material of this article.

After the hat has been shaped and fashioned, it is dyed in a liquid prepared of logwood, and a mixture of green copperas and blue vitriol; when it is stiffened with common glue: the beer grounds (which are previously applied to the inside, to prevent the glue from penetrating through to the face) being perfectly dry. In the dyeing process, however, our hatters acknowled their inferiority to those of France, and Holland, which is imputed to the water on the continent being kept for many months, nay, in some places, for years, before it is used. Various other little operations are still required, in order to soften and give the hat its final shape, after which it is lined and trimmed for sale.

A patent was granted in January 1782, to Mr. ROBERT GOLDING, of Southwark, hat-dyer; for his method of dyeing, staining, and colouring beaver hats green, or any other colour. The inventor directs the nap of the hat to be raised by means of a *card*, on the side intended to be dyed, and then boiled in alum and argol. A thin paste should be made of flour, or clay, which is spread over every part that is not to be dyed, and then closed: or the hat may be previously pasted, and instead of being boiled, it should be only simmered in the same liquor. As soon as the paste is spread, plates of copper or other metal, shaped like a common funnel, are fixed over the paste, to prevent the dye from penetrating through. In this state, the hat is immersed in the dye, till the colour be sufficiently fixed; when it is taken out, opened, and cleansed from the paste: but, if any colouring particles have penetrated through the felt, they may be removed by rubbing them with a small quantity of spirit of salt, aqua fortis, &c. The compounds employed in dyeing, are fustic, tur-

meric, ebony, saffron, alum, argol, indigo, and vitriol, with urine, or pearl-ash, at the option of the dyer; all of which are used together, or separately, according to the colour required.

Among the different patents granted to hatters, for discovering new materials in this manufacture, such as that of Mr. J. BURN, in 1792, for *mole-fur;* and another to Mr. J. TILSTONE, in 1794, for *kid-hair;* we shall only notice an invention of Mr. GEORGE DUNNAGE, who, in November 1794, obtained a patent for his *Water-proof Hats*, in imitation of beaver.

The articles he employs are similar to those commonly used for the making of hats, with which he mixes Bergam, Piedmont, or Organzine silk. These are dressed and worked in a peculiar manner; though we understand that hats thus prepared become heavy and opprsssive to the wearer, while they acquire an ugly colour. The curious reader will find the patentee's specification inserted, at full length, in the 4th vol. of the *Repertory of Arts and Manufactures.* The same manufacturer procured another patent in November 1798, for a method of ventilating the crowns of hats. This invention consists in separating the top from the sides of the crown, so that the tip, or top crown, may be either raised or let down at pleasure, in order to admit the external air, or to exclude it from circulating in the crown of the hat. The whole contrivance is effected by means of springs, sliders, sockets, grooves, loops, and cases, which are connected with the top and side-crown: thus the admission or exclusion of atmospheric air in front, behind, or on either side, may be regulated accordingly. As this invention is ingenious, we refer the reader to the 10th vol. of the work last quoted, where he will find a minute account, illustrated by an engraving.

In November, 1801, a patent was obtained by Messrs. JOHN WALKER and PETER ALPHEY, for contriving water-proof hats and caps, as likewise for rendering silk, linen, leather, cotton, and other materials for wearing apparel, water-proof. Their invention consists in providing the respective articles with a coat of oil-paint; after which they are japanned with a varnish mixed with lamp or ivory-black. The caps and hats are manufactured of paste-board covered with canvas, and treated in a similar manner; but the leather, to be made water-proof, should not be previously dressed with oil, or any unctuons matter. For a more minute account of the method in which the different compositions are applied, the reader will consult the 16th vol. of the "*Repertory of Arts*," &c.

[The art of *hat-making* has been fully detailed by Mr. NICHOLSON, in his *Philosophical Journal*, vol. 1, 2, and 3, 4to. to which the reader is referred.]

HATCHING, is the maturation of, or communicating life to, fecundated eggs, either by the incubation and warmth of the parent bird, or by artificial heat.

The art of hatching chickens by means of ovens, has been long practised in Egypt, where it is confined to the knowledge of the inhabitants of a single village and its vicinity. This method being easily understood, we shall only observe,

that each brood is supposed to consist of 30,000 chickens; the number of ovens amounts to 386, which are in constant employ for six months; and, as the eggs are completely hatched in three weeks, or about the same period as a hen continues to sit upon a brood, it has been calculated that the ovens of Egypt every year communicate life to at least 92,640,000 chickens!

A very ingenious and useful method of hatching eggs, we conceive, is that invented by the celebrated naturalist REAUMUR, who reduced this art to fixed principles. The degree of heat necessary for the purpose, is nearly the same as that marked 36 deg. on his own thermometer, which is equal to about 96 deg. of FAHRENHEIT, as well as to the heat both of the skin of the hen and all other fowl.

M. REAUMUR employed stoves of any shape, which were heated by means of a baker's oven; or in a room warmed by an oven underneath: the eggs were here deposited, and occasionally shifted in a similar manner as the parent birds move them; in order that each egg might equally participate in the irregularities of the stove. The only important object is, to ascertain the precise degree of heat: with this design, he melted and poured into a phial two parts of butter and one of tallow. When the heat was of a proper temperature, the liquid grease resembled a thick syrup; if it was too great, the mixture flowed like oil, on holding the phial sideward; but, when the heat was too low, it remained fixed in a lump. Thus, by placing the phial into the stove, the proper degree of heat may be easily regulated. He also invented a kind of hollow covers, or low boxes, without bottoms; and lined with fur, which he called *artificial parents*. These not only shelter the chickens, when hatched, but also afford them a genial warmth, so that they fly under the boxes as readily as they resort to the protection of the wings of the hen. In a few days, they may be turned out into the open air, and committed to the care of capons, or even cocks, which may be taught to perform the maternal office, and watch them with as much solicitude as is evinced by hens.

HAULM, HALM, or HAWN, among farmers, signifies the stem or stalk of corn, pease, beans, &c. from the root to the ear.

The haulm of beans affords an excellent fodder for working-horses; that of pease, if saved in a favourable season, makes nourishing and wholesome food for horses, cattle, and sheep. The stalks of potatoes are of considerable utility as a manure: if spread on coarse, sour pasture, they will totally change its nature, and enhance the value of the land from ten to fifteen shillings per acre.

HAW, or HAUGH, in farriery, is a spongy excrescence in the inner corner of the eyes of horses, or other cattle, and which, if not timely removed, will occasion total blindness. It arises from gross humours, and is known by the watering of the eye, and the opening of the lower side.

To cure this excrescence, farriers direct the affected animal to be held fast by the head, and the upper eye-lid to be drawn back by means of a needle and strong thread; which, in cows or oxen, may be tied to one of the horns. The *haw* is then to be carefully cut out with a knife, after which the eye should be dressed, then

washed with a sponge dipped in beer or ale, and salt, in order to cleanse it properly, and absorb the blood. This operation, however, ought to be performed only by skilful farriers, as many valuable horses have been rendered irrecoverably blind by the deep cutting of ignorant pretenders. In such case, the wound must be dressed with honey of roses; and, if any fungous or spongy flesh should arise, it ought to be sprinkled with burnt alum, or to be touched with blue vitriol, that it might be completely eradicated. Where sheep are affected with the *haws*, the practice is to drop the juice of chamomile, or crow's-foot, into the eye.

[The method of removing haws, was noticed under the article EYE.]

HAWK, the COMMON, or SPARROWHAWK, *Falco Aisus*, L. is a bold and spirited bird: it abounds in almost every part of Europe; and varieties of it are found dispersed over the whole earth.

The length of the male of these birds is twelve inches; that of the female fifteen; the former differs both in size and colour from the latter. The female builds her nest in hollow trees, high rocks, or lofty ruins, sometimes in the old nest of a crow, and generally lays four or five eggs, marked at the pointed end with reddish spots.

The Sparrowhawk is obedient and docile: by keeping him awake three or four days successively in a hoop, till he become almost delirious, he may afterwards be easily trained to hunt partridges and quails. In a wild state, however, these creatures commit great depredations on pigeons, poultry, rabbits, hares, &c. so that the following method of catching them will probably be acceptable to many readers.

A hawk-cage, made upon a plan similar to that of a gold-finch trap-cage, but larger, and baited with two house-sparrows, should be exposed in a fine clear morning, on a hedge, or some other open place, and left out till late in the evening. By this simple contrivance, those predatory birds might be easily taken, and either destroyed, or preserved for the purpose of hawking; an amusement that has lately been abandoned in this country, and therefore requires no description.

HAWK-MOTH, or *Sphinx*, L. is a genus of insects, comprising 165 species, ten of which are discovered in Britain, and variously named, according to the trees they infest.

The generality of hawk-moths spin their cods under ground, interweaving with their threads small particles of grain and earth. They appear either early in the morning, or after sun-set: their flight is slow, and often accompanied with a peculiar sound. The caterpillars of these insects are usually found rolled up in the leaves of trees; some being green, and smooth; others brown or yellow; again, others are spotted, and furnished with rings, or belts.

The most certain method of preventing the depredations of hawk-moths, consists in collecting the leaves they inhabit, and crushing the insects; after which the trees should be washed with a mixture of clear lime-water, and a decoction of tobacco leaves. Such cleansing will, according to Mr. FORSYTH, also be found an effectual remedy, when the moths are in a state of

larvæ; having previously picked off, and destroyed the caterpillars.

HAWKWEED or *Hieracium*, L. a native genus of perennial plants, comprising forty six species, the principal of which are:

1. The *Pilosella* Mouse-ear Hawkweed, which grows in dry meadows, pastures, and on walls; its flowers possess the singular property of opening in the morning, and closing early in the afternoon: they blow from May to September, This species differs from other lactescent plants, being less bitter, and more astringent, on which account it was formerly esteemed in the cure of blood-spitting. It is considered as noxious to sheep, which are not partial to it; and though eaten by goats, it is refused by horses and cows.

2. The *auricula*, Narrow-leaved Hawkweed, or Umbelled Mouse-ear, thrives on mountains, in the county of Westmoreland, and flowers in the month of July. It deserves to be cultivated on the borders of gardens where bees are kept; for, according to BECHSTEIN, it furnishes them with an abundance of wax and honey.

HAWTHORN, or *Cratægus*. L. a genus of plants, consisting of twenty-five species, three of which are natives of Britain.

1. The *Aria* (*Pyrus Aria* of Dr. SMITH,) White-beam Hawthorn, or Wild Pear-tree, which grows in woods and hedges, especially in mountainous situations with a calcareous soil, and flowers in the month of May. It delights in dry hills, and open exposures, thriving either in gravel or clay. It will bear lopping, and does not prevent grass from growing beneath it. The white-beam hawthorn is eaten by sheep and goats, which last animals devour it with avidity. Its fruit is red, and when mellowed by the autumnal frosts furnishes a grateful repast; a spirituous liquor may be obtained from it by distillation. This species seldom produces a good crop of fruit for two years in succession: but its barrenness is amply compensated by the utility of its hard, tough, and smooth wood; which is formed into axle-trees, wheels, walking-sticks, carpenter's and other tools: its seed should either be sown as soon as it becomes ripe, or preserved in damp sand.

2. The *Oxyacantha* (*Mespilus Oxyacantha* of Dr. SMITH) White-thorn, or May, which grows in hedges, woods, and old parks. This is a very valuable shrub, and on account of the stiffness of its branches, the sharpness of its thorns, and its hardiness in enduring the severest winters without injury, it is universally preferred for making fences and hedges. The berries during winter afford food to various birds, but may be more usefully employed in fattening hogs: the wood is very tough, and, like the white-beam hawthorn, converted into axle-trees and handles for tools.

There are several varieties of this species, of which we shall mention only the celebrated GLASTONBURY THORN. It is in bloom twice in the year: the winter blossoms (about the size of a sixpence) appear about Christmas, and much earlier, if the winter be very severe. These, however, produce no fruit. This extraordinary thorn has been celebrated for its age, for nearly a whole century; the oldest inhabitants never having observed it in anyother than itspresent state. The berries of this miraculous va-

riety contain only one seed; and, when sown, produce plants which differ in no respect from the common hawthorn.

3. The *torminalis*, Wild Service-tree, Sorb, or Service Hawthorn, which grows in woods and hedges, and flowers in the month of May. Its dark yellow berries ripen in October, and may be eaten either raw or preserved in sugar. They also yield, on fermentation, a good vinegar, as well as an ardent spirit by distilling them: where they abound, hogs may be easily fattened.

[There are several native species of *Cratægus* or Thorn in the United States. See HEDGE.]

HAY, signifies any kind of grass, that is cut and dried for fodder.

The time of mowing grass for hay, ought to be regulated according to its growth and maturity; for it is extremely detrimental to a crop, to cut it too early; because the sap has not sufficiently circulated through the whole blade of grass; so that the latter, when made into hay, shrinks and considerably diminishes in bulk. It is, however, equally prejudicial to the grass, if it be suffered to stand till it shed its seeds. When the tops of the grass appear brown, it will then be fit for being mowed.

The chief object in making hay, is to preserve the vegetable juices: with this design, different methods have been adopted, of which we shall notice the principal.

In the county of Middlesex, whence the London markets are chiefly supplied with hay, all the grass mowed on the first day, before nine o'clock in the morning, is *tedded*, that is, uniformly spread over the meadow, divided as much as possible, and well turned, before twelve o'clock, and perhaps a second time in the afternoon. It is then raked into wind-rows, and formed into small cocks.

On the second day, the grass mown the preceding day after nine o'clock, and what is cut on this day before that time, is tedded, and treated in the manner above described. Previously to turning the grass of the second day's work, the small cocks thrown up on the preceding day are well shaken out into *straddles*, or separate plats, five or six yards square. If the crop be so thin as to leave large spaces between the plats, they ought to be raked clean. The next business is, to turn the plats, and also the grass cut on the second day, which is generally done before one o'clock, in order that all the grass which is mowed may be drying while the people are at dinner. In the afternoon, the straddles or plats are raked into double wind-rows; the grass into single ones; and the hay is thrown up into *field-cocks* of a middling size, also called *bastard cocks;* the grass is then cocked, as on the preceding day.

Similar operations are successively performed on the third day; the hay in bastard cocks is again spread into straddles, and the whole is turned previously to the people going to dinner. Should the weather have proved fine and warm, the hay that was made into bastard cocks on the second evening, will, in the afternoon of the third day, be fit to be *housed*. On the fourth day, the hay is put into stacks. This method has, from experience, proved very successful, especially in favourable weather.

On the Duke of ARGYLE's es-

tates in Scotland, the hay is dried on pins in barns; and, when thus made, it has been found to be remarkably green and sweet.

According to Dr. ANDERSON's plan, the grass is to be cut only when it is perfectly dry, without spreading it out into swaths, windrows, &c. or tedding it, as is the general practice. Immediately after it is mowed, it is thrown up into small and narrow cocks about three feet high; each cock is slightly thatched, by drawing a little hay from the bottom of the cock, which is laid on the top, with one of the ends downwards. Thus, the hay may with ease and expedition be rendered equally safe from rain and wind, unless a violent storm should occur immediately after the cocks are raised. And, if they be put up when the grass is perfectly dry, Dr. ANDERSON affirms that they "never sit so closely as to heat," though they become in the course of a day or two so firm as not to be liable to be overturned, unless by a hurricane.

In these cocks, the hay is suffered to remain for a week or a fortnight; till upon inspection it is judged that they will keep in tolerably large *tramp-cocks*; in which case two men, each of whom is provided with a pitch-fork, carry the small cocks between them successively to the place where the *tramp-cocks* are to be raised. The advantages attending this method are: 1. That the labour is considerably shortened; 2. That the hay continues almost as green as when it was first cut, and that it retains its natural juices in the greatest perfection; whereas, by spreading it out, tedding it in the sun, &c. it becomes bleached, its sap exhales, and it is frequently much damaged by the rain. Particular care, however, ought to be taken, that the grass be perfectly dry, when first piled up into cocks: for, if it be in the least degree wet, it will speedily become mouldy, clog together so closely as to be impervious to the air, and never dry, unless it be spread out in the sun. To prevent such an accident, Dr. ANDERSON directs the cutting of the grass to be commenced during fine, settled weather in the morning, and not to suffer the haymakers to touch it, till the dew be evaporated.

In the 28th vol. of *Annals of Agriculture*, we meet with a communication from DAVID BARCLAY, Esq. of Walthamstow, Essex, who has employed Dr. ANDERSON's method of making hay with success; but, instead of conveying the hay by hand to the stack, he caused a cart rope to be fixed round the bottom of a large cock, and to be drawn by a horse to the stack, while a man fixes a pitch-fork in the opposite side, and thus pushes the cock.

Dr. DARWIN proposes a middle way to be adopted between the different methods practised in the North and South of Britain. If the swath of cut grass be turned over only once in the course of a day, for three or four days, the internal parts of it become in a manner dried in the shade; and, if it be afterwards spread over the ground only for a few hours in a fine day, he believes the hay would become sufficiently dry to be stacked. He strongly recommends the grass to be thrown into small cocks at night, especially if the weather be damp, to prevent it from being injured by the excrements and slime from the vast num-

bers of worms, which rise out of the ground during warm moist nights. For this reason, the hay-cocks ought to be made as high in proportion to their base as possible, that a less surface may be in contact with the ground, while the broader top is exposed to the action of the air, by which the exhalation of its moisture is accelerated and the hay itself is secured from accidental showers.

In wet seasons, Dr. DARWIN thinks the best method is to turn the swaths every day, or every other day, or make them into small cocks; thus to secure the whole from the injuries of incessant rains; and also to prevent the parts next the ground, as well as in the middle from fermenting and putrifying. When the weather becomes more favourable, the hay may be made into large cocks, so that the perflation of the atmosphere will not only cause its moisture to exhale the more quickly, but an incipient fermentation will discharge a portion of heat and thus contribute to dry the hay, by increasing the evaporation: in a similar manner, the remarkable heat generated in hay-stacks, finished only one or two days, greatly contributes to dry the whole stack.

Hay constituting the chief food of horses and other cattle, especially during the winter different contrivances have been suggested to prevent it from being injured by rain, while making. And here we cannot but recommend the practice of *tippling*, which we have already described; as from its simplicity and facility, it is equally applicable to clover and other grasses.

In the 14th vol. of the *Transactions of the Society for the Encouragement of Arts*, &c. Mr JOHN MIDDLETON, of Lambeth, gives an account of a machine to be used in the making of hay. It consists of a back and two sides, or gates, each of which is about seven feet in length. The frames, or exterior parts, are of oak or ash, that of the back being four inches by four, while those of the wings are three inches by three. Between all the frames are fixed deal planks three inches by two and a half, and at the end of each wing, or gate, are chains, to which the horses are to be fastened by means of splinter bars. Before this machine can be employed, the hay is to be put into rows; the animals being harnessed, and managed by persons mounted on them, they are slowly driven on, so that all the hay may be collected between the gates. When the machine is filled, and the load is to be drawn to a distant place, the horses must be kept as closely together as possible.

We conceive Mr. MIDDLETON's implement will be found useful during the ardent heat of summer, especially when there are but few labourers, in dragging the hay together as soon as it is sufficiently made, and thus preventing it from being parched. In showery weather, it is said to be still more serviceable; as in case of approaching rain, the grass may be collected immediately, formed into a stack, and sheltered from wet by a cloth, or by treading it closely together, leaving a ridge in the middle, and by raking it down on the outside. He observes, that during the wet summer of 1795, this machine was particularly convenient; and that, if the boys or drivers be

steady, and the horses tractable, or accustomed to the work, ten acres of hay may be effectually secured in little more than one hour.

[The following description of a hay-harrow, or rake, is taken from the *Trans. Dublin Soc.* having originally appeared in the works of the *Rotterdam Society*.

As the object of this contrivance is to diminish labour, the Editor thought it might prove useful to the farmers of the United States, and hence has given a full account of its merits.

If the hay, when raked by the machine, dries so rapidly as stated, in the cool moist air of Holland; the hay-rake must answer an excellent purpose in our warm dry air.

The hay-rake is of the size of a harrow. The upper and under rails are two or three inches square, and nine feet long, fastened together with three pieces, five inches broad, one inch and a quarter thick, and four feet four inches long; one in the middle, and the other two on each side, ten inches from the ends of the rails, as at *a a*. To give this machine yet more strength, there must be two diagonal braces *b b*; in each of the rails must be five teeth six inches long in the clear, and three quarters of an inch in diameter, placed as in the plate, and sloping outwards to the rear; for if they slope forward, or are upright, they will cluster the grass too much in lumps. The teeth may be made of iron, and a little smaller, if the harrow sinks through the hay or grass into the ground. The hay-harrow is drawn by a horse, upon which a man sits, who scatters the hay, by harrowing it from the swath, as thick as is necessary to dry it. Three acres of grass may be turned in one hour, and well mixed; and on a warm dry day, the horse may be kept constantly going; when the last of the acre is turned, the first of it may be begun with, because the grass may be sufficiently dry on the upper part, so that if this work be done at an early hour of the day, the cocks may be made up in the afternoon; because if it should not be yet sufficiently dry, it will be so before it is all cocked.

Hay composed entirely of red clover has been proved by repeated experience to be injurious to horses when given constantly. *New* clover hay is said to hurt their eyes, and *old* clover hay to injure their wind in an evident manner. These are singular effects, and not yet well explained: but as the facts stated are the result of numerous enquiries among men the least liable to prejudice, the reader is cautioned against the injury he may sustain, from inattention, disbelief, or ignorance of these properties of clover hay. Timothy or green grass, should therefore be mixed with clover; and every species of hay should be well salted, by sprinkling salt over the surface of every course of hay. The effect of salt in making even poor hay palatable, was stated under the head of CATTLE, vol. 2d, on the authority of an experienced feeder and grazier.]

In the 2d vol, of the *Transactions* of the same Society, Mr. RICHARD TOFT, of Kentish Town, describes a contrivance for securing hay-ricks from rain, while they are raising; for which he was rewarded with a silver medal. It consists of 240 yards of coarse cloth, called *duck*, prepared with tar and oil; three scaffold-poles, two of which are upright, the third is thicker in

the middle than at the ends, being intended for a ridge; two double blocks; four pedestals, and about one hundred weight of tarred rope: beside these articles, there is a reel, or windlass, together with pullies, and iron work, &c. the whole expense of which amounts to about 28*l.* The pedestals are to be placed four feet in the ground, for the reception of the poles. The width of the cloth is required to be greater than its length, as it is to be raised by a ridge-pole, for the admission of air: and as the stacks are generally wider in the middle than at the bottom, the cloth is divided into two parts, that it may be the more easily folded over the pole. When a rick is advanced above the eaves, and begins to become narrow, Mr. TOFT directs the cloth to be taken down, by unhooking one end of the ridge-pole, and letting it down by means of a rope; after which the other is to be unhooked, &c. in a similar manner. The cloth may be suffered to rest upon the sides of the rick, but, in case of high winds, it will be requisite to fasten it with ropes.

In erecting the stacks, great caution is necessary that the hay be not put together before it is perfectly dry; in which case it not unfrequently happens that whole stacks are suddenly reduced to ashes. To prevent such accidents, a chimney or funnel is usually made in the centre of the stack, but it then becomes necessary to form *culverts* beneath the stack, by digging three or four trenches; covering them with boards or sticks; and exposing their apertures in every direction to the wind, in order to ensure continual ventilation.

As the erecting of funnels in stacks is not universally adopted, it is of consequence to ascertain the degree of heat which the stacked hay has acquired, lest it should at any time take fire. One of the easiest methods is that pursued by Mr. DUCKET, and which consists simply in thrusting a *scaffold-bolt*, or some long iron bolt into the hay rick, and then introducing a gun, or ram-rod, furnished with a strong worm, and screwing out a sample, by which he not only discovers the heat, but also the colour of the hay; and if the stack require air, he perforates it in several parts with similar holes, which thus answer every purpose of a ventilating funnel.

In Lancashire, barns have, within these few years, been erected for the preservation of hay, whence they are denominated *hay-barns.* They are built upon pillars, and covered with slates. Sometimes they are provided with floors boarded with planks, loosely placed, perforated with holes, and lying hollow for a certain space above the ground, for the purpose of admitting a free circulation of air beneath. These buildings are cheap, useful, and very convenient in bad weather: they afford such advantages in the preservation of hay, as will in a short time amply repay the expense of erecting them.

Having already pointed out the necessity as well as the utility of giving salt to cattle, we shall here only remark, that the most intelligent farmers sprinkle the salt while the stack is raising, alternately between each layer of hay, in the proportion of 1 cwt. of salt to seven or eight tons of hay. Every species of cattle will prefer inferior food thus prepared, to the finest

hay in its raw state: for the salt assimilating with the juices of the hay, prevents too great a fermentation, and imparts a superior flavour. Farther, the salting of hay-ricks effectually secures them from becoming over-heated, or mildewed; so that the hay may be put together, without the least danger of its taking fire, in a much greener state than would otherwise be safe.

An excellent apparatus for securing hay and corn-stacks, has been contrived by Sir JOSEPH BANKS; but, as an adequate idea of it cannot be conveyed without the aid of an engraving, we refer the reader to the 10th vol. of *Annals of Agriculture*, where its description is illustrated by a plate.

A patent was granted in February, 1801, to Mr. WILLIAM LESTER, of Cotton End, Northamptonshire, for his improved engine for cutting hay, straw, tobacco, &c. of which we shall give a farther account under the head of STRAW-CUTTER.

HAYS, signify a particular kind of net, for taking rabbits, hares, &c.

As rabbits frequently straggle abroad at mid-day for fresh grass, two or three of these nets are directed to be pitched at the entrance of their burrows. The sportsman then goes round their haunts with a dog, and drives them into their burrows, where an assistant seizes them as they enter.

HAZEL-NUT TREE, or *Corylus*, L. a genus of plants consisting of four species: one of these is a native of Britain, namely, the *avellana*, or Common Hazel-nut-tree. It grows in woods, copses, and hedges; flowers in March or April.

All the different species of the hazel are large, hardy, and deciduous shrubs; they have several varieties, valuable for their fruit, which, in a cultivated state, are known under the name of *Filberts*.

These shrubs prosper in almost any soil or situation: and may be propagated either by layers, or by planting their nuts in February; for which purpose the latter should be preserved in sand, in a moist cellar, inaccessible to vermin; but they should not be secluded from the external air, for want of which they will become mouldy. When reared in coppices, this shrub produces abundance of underwood, that may be cut every 5th, 7th, or 8th year, according to the purpose for which it is designed.

The uses of this wood are various: it is employed for poles, hoops for barrels, spars, hurdles, handles for implements of husbandry, walking-sticks, fishing-rods, &c. Where beautiful specimens are required for veneering or staining, the roots of the hazel-nut tree are preferable to the branches. In Italy the chips are used for fining turbid wines; and in countries where *yeast* is scarce, the twigs of this shrub, dried, and afterwards soaked in the fermenting liquor, serve as a substitute for that article in brewing. Painters and engravers prepare coals for drawing outlines, from the wood of this plant, by the following process: Pieces of dried hazel, about the thickness of a finger, and four or five inches in length, are put into a large pot filled with sand, and the top of which is closely covered with clay. In this manner they are placed in a potter's oven, or otherwise exposed to a sufficient degree of heat; and, on cooling, the sticks are found to be converted into charcoal, which draws freely, and is

easily effaced with India-rubber.

According to EVELYN, no plant is better calculated for thickening copses than the hazel; with this view he recommends the following expeditious method: Take a pole of hazel (for which ash or poplar may be substituted) of 20 or 30 feet in length, the head of which is somewhat *lopped* into the ground; the pole should likewise be chopped near the soil, in order to make it yield: thus fastened to the earth with a hook or two, and covered with fresh mould sufficiently deep, it will produce an incalculable number of suckers, speedily thicken, and furnish a fine coppice.

The kernels of the fruit of the hazel-nut tree, though difficult of digestion, have a mild, farinaceous, oily taste, which is agreeable to most palates: yet *filberts* are said to be more nourishing than nuts: both, however, operate as a cathartic, when chewed small and taken in considerable quantities; but produce constipations of the bowels, if swallowed in large pieces; and dysentery, if eaten unripe. A kind of chocolate has been prepared from this fruit, which has also occasionally been converted into bread. An expressed oil is obtained from the nuts, which is little inferior to that of almonds: it is often preferably used by painters, as it readily dries; and chemists employ it as the basis of fragrant oils artificially prepared, because it easily combines with, and retains, odours. An emulsion made of the kernels, and taken with good old mead, is recommended for inveterate dry coughs. Squirrels and mice are excessively fond of the nuts; goats and horses eat the leaves, but they are refused by sheep and hogs.

HEAD, the uppermost or foremost part of the animal body.

As the foundation of many diseases is laid, by taking cold in this part of the frame, we shall offer a few hints relative to its covering. For new-born children, an easy and moderately warm head-dress is fully sufficient during the first weeks of their existence; as superfluous ornaments only tend to encumber and to fatigue them. The infant's cap, however, ought not to be narrow, nor tied too closely, lest the head be compressed, the muscles of the ears crippled, and the sense of hearing impaired.

It is equally hurtful for children and adults to walk in the sun with the head uncovered, yet our cumbersome black hats, though sanctioned by custom and fashion, are generally too heavy for the hot days of summer; they ought to be manufactured of lighter materials, and either white, or dyed of some light colour, especially for soldiers, travellers, and persons labouring in the field. Such individual should wear hats made of oil-cloth, supported by fine wires, or of straw, chips, &c.

In this temperate climate, youth may with safety be accustomed to go with their heads uncovered; but, in those countries where either of the two extremes of heat or cold prevail, the opposite practice must be adopted.

Many diseases, however, might be avoided, were the trite, but true maxim of "keeping the head cool," more strictly attended to. Hence the wearing of thick and warm night-caps, whether at night, or in

the day time, cannot be too much reprobated; as those who indulge in this whimsical habit, render themselves continually liable to take cold from the slightest change in the atmosphere.

[The dress of the head both day and night, should be accommodated to the state of the weather. A chip hat in winter would not be more absurd than a netting night-cap in winter. In cold weather the head should be defended at night by a thick cap of cotton or flannel lined with muslin, in order to preserve an uniform temperature of body, and thus prevent the undue action of the external cold air upon the head. See TEETH.]

HEAD-ACH, or *Cephalalgia*, a painful sensation in the head, produced by various causes, and attended with different effects, according to its various degrees, and the part of the head where it is situated.

Head-ach, in general, is only a symptom of disease, and frequently occasioned by effusions of blood on the brain, as also by ulcers, accretions, &c. on that sensible organ. Persons of a sedentary life, or those subject to costiveness or indigestion, are more peculiarly liable to the attacks of the head-ach. An acrimonious state of the fluids; the stone; catarrhs; contusions on the head; a diseased state of the teeth; piles, hysterics; strong odours of every kind; the fumes of tobacco; rheumatism; gout; scurvy; worms, both in the intestines and in the head; too much hair; grief; and intoxication, are among the numerous causes of this affection, which is sometimes so violent as almost to deprive the unhappy sufferer of his senses.

Where the head-ach originates from an internal cause situated within the brain, it is seldom curable. In nervous affections, relief may sometimes be procured by venesection, cupping, or leeches; by sneezing remedies, blisters, issues, or other topical discharges near the head; by purgatives; or by determining the fluids to other parts. Frequent combing and cutting of the hair, as well as bathing the feet in tepid water, will likewise be found very serviceable. A poultice of elder flowers applied to the part affected, has been sometimes attended with good effects, as also has the holding of a piece of hellebore in the ear.

According to THUNBERG, Cajeput-oil, applied to the head, will afford considerable relief. Similar success has attended the application of æther and spirits of hartshorn as a sternutatory, and as a local remedy. It is asserted, that the most acute and obstinate head-achs have been removed by the use of vervain, both internally in the form of a decoction, and also by suspending the herb round the neck. Strong coffee has likewise been of considerable service, especially to phlegmatic habits, and those whose digestion is impaired.

[The *nervous head-ach*, to which women are peculiarly liable, is a distressing complaint; it may be greatly alleviated by taking ten, 15 or 20 drops of laudanum on the approach of the symptoms, and by retiring to a dark silent room. A cup of coffee without milk, taken when the first effects of the anodyne are over, will prevent or mitigate the sickness of stomach, which sometimes ensues a dose of opium.]

The diet of persons afflicted with the head-ach ought to consist

of such emollient substances as will prevent costiveness; for instance, stewed prunes, apples, spinach, &c. The drink should be diluting, such as barley-water, or infusions of malt, &c. Their feet and legs should be kept warm, and the head shaved, frequently bathed with warm water and vinegar, retaining it as much as possible in an erect posture.

Head-wark. See Red Poppy.

HEALTH, is a proper disposition of the several constituent parts of the body, by which they are enabled to perform their respective functions without any impediment.

The continuance of health depends chiefly on what has been professionally called, the six *non-naturals;* namely, air; food; exercise; the passions; evacuation and retention; sleep and waking: treating of these subjects in their alphabetical series, and the restoration of health being the object of medicine, we refer the reader in both respects to the different articles, according to the order in which they occur.

Moderation, however, in the strictest sense of the word, is equally essential to the preservation of health, as a pure air, and wholesome food. Cleanliness, too, ought by no means to be neglected; for an unclean person very seldom enjoys good health. Hence, frequent washing of the skin is of the first importance; and we are fully persuaded, that most of the diseases, with which the lower classes of people are affected, especially in crowded neighbourhoods, originate from the filthy state which is but too evident in many of their wretched habitations.

With respect to those persons who propose to reside in hot climates, we shall state only a few simple rules, by an attention to which their health may be effectually preserved.

1. Abstain from all excess in spirituous liquors.

2. Avoid with the utmost care the evening dews, or wetting of the feet on the approach of night; as fatal sore throats not unfrequently arise from this source. Should the feet, however, have been wetted by any accident, let the whole body be speedily immersed into cold water.

3. Bathe every morning in the sea, or, if possible, in sea-water; but, where that cannot be procured, dissolve an ounce of salt in a bason of water, and wash the skin with the solution, after which put on the clothes without drying the skin. This operation strengthens the muscular fibres, and covers the skin with a kind of saline crust, which, in the opinion of Dr. Hales, effectually prevents all febrile infections. With these precautions, he asserts, a person of a sound constitution may enjoy as good a state of health in the hottest as in the most temperate climates.

HEARING, is one of the external senses, and expresses the act or faculty of perceiving sounds.

Animals possess this sense in a more acute degree than man; the owl and the hare enjoy the faculty of hearing in a pre-eminent degree: by means of it, the former perceives the slightest sounds, and is thus enabled to seize her prey, while the timid hare is cautioned against approaching danger. This very delicate sense is liable to be impaired by a variety of accidents; hence arises that unpleasant defect called Deafness,

of the causes and cure of which we have already treated.

HEART, a hollow muscle of a conical form, situated at the bottom of the thorax or breast: its basis is turned towards the right, and its point towards the left side. The former, whence the great blood-vessels take their origin, is covered with fat, and has two hollow appendages, called *auricles*, from their resemblance to an ear. The whole consists of two cavities, which are separated from each other by a thick muscular septum: one of these is called the *right* and the other the *left ventricle*.

The heart, which may be considered as the most powerful muscle in the animal body, serves to facilitate the motion or circulation of the blood, which is communicated to the different parts of the frame, by means of various arteries and veins. These, however, it is the province of anatomy to describe; and as that subject does not enter into our plan, we trust this brief explanation will suffice.

HEART-BURN, or *Cardialgia*, an uneasy sensation of heat in the stomach, which is frequently attended with nausea and sickness.

The heart-burn generally arises from a prevailing acidity, indigestion, the eating of tough fat meat, and unfermented mealy substances. Those persons who are subject to this affection, ought to drink no stale or acid liquors, and to abstain from flatulent food.

If indigestion, or debility of the stomach, be the cause, the patient may take infusions of Peruvian bark, valerian, or any other stomachic bitter. Moderate exercise in the open air will contribute to promote digestion, and consequently remove the complaint.

Should the heart-burn originate from acidity of the stomach, the general practice is to administer absorbent medicines, such as prepared chalk, crab's claws, calcined oyster-shells, &c. a tea-spoonful of either being given in a glass of peppermint-water, which frequently procures relief.

There are, however, many cases in which absorbents tend to aggravate rather than to cure this troublesome affection; namely, when it proceeds from an acrid and empyreumatic oil generated on the stomach. In such instances, a tea-spoonful of the powder of gum-arabic dissolved in half a tea-cupful of water, and repeating this dose three or four times, if necessary, has been attended with immediate success; and, where the gum cannot be procured, a few blanched sweet-almonds finely chewed, and swallowed, have often produced a similiar effect.

If the heart-burn originate from flatulency, the remedies pointed out for that affection, may be here safely resorted to; such as infusions of anise-seeds, ginger, and other carminatives.

HEART's-EASE, or HERB TRINITY, *Viola tricolor*, L. an indigenous annual plant, growing in corn-fields, &c. It produces generally white and yellow blossoms, intermixed with purple, which flower from May to September. This plant has almost endless varieties, and, when reared in gardens, is known under the name of *Pansies*. It was formerly in great repute for epilepsies, asthmas, &c. At present, however, it is used only in the disorder peculiar to children, called *crusta lactea*, or a species of SCALD-HEAD affecting the face. A handful of the fresh,

or half a dram of the dried leaves, is boiled in a pint of milk, and if continued to be drank for some weeks, both in the morning and evening, it has invariably been attended with success.

HEAT, signifies either the peculiar sensation we feel on the approach of burning bodies, or the cause of that effect, which is FIRE.

Heat is now universally considered as a *modification of a fluid;* but, after the various inquiries of the most able chemists, much remains to be done towards ascertaining all the phenomena of this subtle and invisible element. In this place, we shall only select a few principles in some degree illustrative of its nature and properties: 1. Heat and cold mutually expel each other. 2. Heat is *visibly* occasioned by the concentration of the rays of the sun, and also of the electric fluid. As fire, therefore, is evidently the cause of heat, it follows that both the light of the sun and the electric fluid are *elementary fire.* 3. Heat expands bodies in every direction: hence the elementary fluid, when producing heat, acts from a centre towards a circumference and, when it generates *cold*, moves in a contrary direction. 4. It is, therefore, impossible to calculate the precise quantity of heat which any substance contains. 5. Heat assists the progress of vegetation, but too intense a degree of it produces effects totally different. 6. When *latent* heat is transferred to external bodies, vapours become *condensed*, and in some cases return to their original state: in others, they are productive of light, and a vehement degree of sensible heat, whence the different phenomena of DISTILLATION, EVAPORATION, &c.

With respect to the purposes to which heat is applicable, such as the warming of apartments, &c. we refer the reader to the articles FIRE-PLACE, GRATES, HOT-HOUSES, &c.

[Substances differ greatly in their power of conducting heat, and this quality directs our use of them in a variety of ways, in the arts and domestic œconomy. The simplest mode of determining whether any substance is a good, or bad conductor of heat, says Mr. MORE, (*Essay on Ice Houses*) is by heating or burning one end of a small piece of some material, and holding the other end in the fingers, if it can be ignited or burnt close to the fingers, without much sensation of heat, it is a slow conductor: if on the contrary, a sensation of heat is perceived when the ignition or burning is at some distance from the fingers; it is a good or quick conductor of heat.

Metals differ very sensibly in their conducting power. By a variety of experiments, conducted by the celebrated Dr. INGENHOUZ, by the direction of Dr. FRANKLIN, it appears that the powers of the several metals in conducting heat from the best to the worst, appear to be in the following order.

Silver,	*Iron*,
Copper,	*Steel*,
Tin,	*Lead*,
Gold,	

Charcoal and wood are very slow conductors of heat: a quality which renders both of extensive utility for various purposes...See articles KITCHEN, EIRE-PLACES.]

HEATH, or *Erica*, L. a genus of plants comprising 100 species, five of which are natives of Britain. The principal of these is the *vul-*

garis, Common Heath or Ling. It grows on heaths and in woods; flowers from June to August.

In the island of Islay, in the west of Scotland, a wholesome ale is prepared, by brewing one part of malt, and two parts of the young tops of heath, to which hops are occasionally added.

In England, the common heath is employed in making brooms and faggots, which last are used either as fuel in ovens, or for filling up drains before they are covered..... Horses, sheep, and goats, eat the tender shoots of heath. The stalks and tops are of considerable service in tanning leather, especially for soles; and, if woollen cloth be boiled in alum-water, and afterwards in a strong decoction of the tops, it will acquire a fine orange colour....Bees are very partial to the flowers of this species; but, where heath abounds, the honey acquires a reddish tint.

HEATH, the Berry-bearing, Black Crow-berries, or Crake berries, *Empetrum nigrum*, L. an indigenous plant, growing on moist mountains and elevated heaths, in the driest and most barren lands, as well as in bogs and moorlands. It abounds in Derbyshire, Staffordshire, and the northern counties; flowers in the months of April and May. Its black berries are eaten by the Highlanders; but, if taken in large quanties, they occasion violent head-achs: hence they are more proper for grouse. The plant is not relished by goats, and is totally refused by horses, cows, and sheep:....if boiled with alum, the berries impart a purplish dye.

HECTIC FEVER, a species of slow fever, returning daily, with paroxysms at noon and in the evening: generally attended with profuse perspiration at night; and the urine depositing a sediment like brick-dust.

Causes: Persons of tender constitutions, and those who indulge in violent passions, especially grief are chiefly liable to the attacks of hectic fevers....Besides, luxurious living, abuse of wine, the drinking of impure water, the excessive use of perfumes, as well as the suppression of natural discharges, and an injudicious treatment of catarrhal, putrid, inflammatory and intermittent fevers, are among the numerous causes of this disorder.

Prognosis: Hectics arising in consequence of favourable suppuration of a wound, or ulcer are the least dangerous. But, where they are *confirmed*, it is in vain to attempt a radical cure, as medicine can only mitigate the symptoms, and protract a lingering existence. The changes of the seasons are particularly fatal to young hectic patients who if attacked in the spring, generally languish till the succeeding autumn; or, if they become subject to the disease during the summer solstice, they linger out a wretched existence, till about the same period arrives in the following year.

Method of treatment: As this fever arises from various causes, it must necessarily require different remedies. In general, however, the chief object to be attended to, is the mitigation of the symptoms, by preventing both costiveness and looseness; by procuring sleep, and checking the night-sweats. The use of Peruvian bark has been attended with considerable success; for it tends to stop the progress of gangrenes, and the

suppurations become more favourable. Cauteries applied to the head; antiscorbutics; together with gelatinous, or mealy substances, and the moderate use of generous wine, may be safely administered. In the beginning of the disease, soft, stewed eggs, and raw oysters eaten in small portions, have often proved very beneficial. Dr. HULME recommends the inspiration of fixed air, in hectic fevers accompanied with pulmonary complaints. Much, however, depends upon the diet, air, and exercise. The diet, indeed, ought to consist chiefly of milk and vegetables. Half a pint of either goats' or asses' milk, which last is less viscid than any other kind, should be drank three or four times in the course of a day, and continued for weeks, and even months. Some authors preferably recommend butter-milk, which in their opinion is equal to that of asses; observing that many persons have recovered by the free use of it; nevertheless, it should be sparingly taken at first, and gradually increased till it become almost the only sustenance.

Persons who have been accustomed to animal food and strong liquors, must effect this change by imperceptible degrees; and, by persisting in the course above mentioned, they will in most cases recover, unless the fever have made such progress as to reduce the frame to a confirmed consumption.

HEDGE, in agriculture, a fence inclosing a field, or garden, &c. generally made by intertwining the branches of trees.

Hedges are usually divided into two classes: 1. Outward fences, planted either with hawthorn or black-thorn, of which we have already treated under the article FENCE; and 2. Those intended for gardens, which are planted according to the fancy of the possessor, with holly, yew, or other evergreens.

In forming outside hedges, the plants ought to be as nearly as possible of the same size. The sets should be one-third of an inch in diameter, freshly taken up, straight, smooth, and well rooted. The best season for planting them out, is late in the autumn; and the young hedge ought particularly to be attended to during the first two years; because, if it be then neglected, no future care can recover it. The top-shoots must not be shortened, but the sides regularly pruned for some years, while the inclosure is young; for, only by adhering to this practice the hedge will attain a proper degree of closeness and strength.

The late Mr. BAKEWELL was remarkably curious in his fences: he used to plant one row at the distance of a foot from set to set; and, after making the ditch, to lay the earth dug out of it, so as to form a bank on the side opposite the quick. In other parts of England, the bank is made on the side of the quick above it. The advantage of Mr. B.'s method is, that the plants grow only in the *surface-earth*, not secluded from the atmosphere; whereas, in the common practice, the best earth is generally loaded by a thick covering of mud taken from the ditch, and placed obliquely on the bank. There is, however, a considerable waste of land in the former method: for after

the whole was thus formed, he usually added a double post and rail; one on the outside of such bank, and the other on the outside of the quick.

Hedges designed for ornament in gardens, are sometimes planted with evergreens, among which the holly is preferable to any other; next in rank is the yew, but the dead colour of its leaves renders such hedges less agreeable. The laurel is another plant that may be employed as a fence for gardens; as it is one of the most beautiful evergreens; but it shoots forth with such luxuriance, that it is very difficult to confine it to any shape: its leaves, too, are very large, and, if cut through with the sheers, present a very disagreeable appearance: hence they ought to be pruned with a knife, and the shoots exactly cut down to each leaf.

In the 3d vol. of the *Transactions of the Society for the Encouragement of Arts*, &c. Mr. Leatham, of Barton, gives an account of his method of planting quick-set hedges on dry, gravelly, or *thin* soils. He considers the causes which render such hedges very indifferent, to be....1. That they are set too low or flat on the surface, to allow the roots to strike deeply into the soil. 2. That, when planted higher, they are generally too near the slope of the bank, and thus cannot receive the benefit of the rain. To remedy these inconveniencies, two lines are marked out, 12 feet apart; the upper part of the soil is taken from three feet within each line, and thrown into the centre of the space, so as to form a flat bed, three feet in breadth, in the midst of which the quicks are planted; the remaining space of 18 inches on each side is filled up with the earth, gravel, or sand taken out of the ditches on both sides, by which means the bed is extended to five feet, allowing six inches for the slope of the bank. Quicks, thus planted, will find sufficient nourishment in the soil, before the tap-root reaches the barren gravelly bottom; and the earth thus placed, will retain moisture enough to nourish the plants; so that they will in a short time form an excellent fence, which, by elevating the bank on each side at pleasure, may be protected at a small expence from the ill effects of sharp winds, or the air of the sea. Mr. Leatham observes, that the space, on such low-priced ground, is but small; and, as a good, thriving fence is obtained, it amply compensates the expenses. A hedge, constructed according to the dimensions above stated, cost him fifteen-pence per rod of seven yard in length.

In the 1st vol. of the *Letters and Papers of the Bath and West of England Society*, we meet with a communication, in which *elms* are recommended for fences.... When elm-timber is felled in the spring, the chips made in trimming the trees are to be sown on a piece of newly-ploughed land, and harrowed in, as is practised with corn. Every chip, that has an eye or bud, will speedily shoot like the cuttings of potatoes; and, as such plants have no tap-roots, but strike their fibres horizontally in the richest part of the soil, they will be more vigorous, and may be more easily transplanted, than if they had been raised from seeds, or in any other manner. They possess this farther advantage, that

five or six stems will generally rise from the same chip; and, after being cut down to within three inches of the ground, they will multiply their side-shoots in proportion, and form a thicker hedge, without running to naked wood, than by any other method hitherto practised: Lastly, if they be kept carefully clipped for the first three or four years, they are said to become almost impenetrable.

In the second volume of the same instructive work, we find another communication on the subject of hedges; and the great advantages that might be derived from them, by planting cyder-fruit-trees. If a judicious mixture of such trees were set in hedges, the profit they afford would amply compensate the expenses incurred, without any loss of ground. And, as the best kinds of this fruit are so extremely sour at the proper season of gathering, that even hogs will scarcely touch them, depredations are not to be apprehended.

[The growing scarcity of wood in the United States near the capitals, renders an immediate attention to the planting of hedges absolutely necessary; and as the business is very little understood in the United States, particularly in Pennsylvania, the editor has abridged the excellent observations of Dr. ANDERSON on the subject, and earnestly recommends an attention to them by all American land holders.

Dr. A. says, that a hedge of thorns thrives best in the face of a ditch*. A single row is to be preferred, except on soils free from weeds. The richest and most fertile spot, must be set apart for a nursery, and in the choice of plants the youngest and most healthy, and that have their roots very much multiplied closely by the stem, are to be preferred. The plants must not be suffered to stand in the places where the seeds were originally sown, as the tap root will descend to a great depth, without sending out a sufficient number of lateral shoots near the surface, so that when it is afterwards taken up to be planted in the hedge-row, it has few or no roots that can be raised with the plant, which tends in a powerful manner to check the vegetation of the plant at the time. The plants must therefore be transplanted when young, and the roots shortened with a knife, to increase their ramifications.

Dr. A. Directs to sow the haws pretty thick, transplant the strongest plants the first winter after sowing, and the remainder suffered to remain in the seed-bed one year longer; when they must be transplanted into rows at least four feet from each other, *and kept clean ever afterwards by the hand-hoe*. Dwarf-peas or onions may be planted between the rows.

In the succeeding winter the earth between the rows ought to be dug over with the spade, taking care to go very close to the rows, and to work with a sharp edged tool, the workman always forcing the spade straight down with the back of the spade toward the thorns on each side of the row, as close to it as possible, so as to cut the greatest part of the lateral roots as near the body of the plants as possible, which will tend to

* It will be seen hereafter that a ditch is unnecessary in the United States...*Editor*.

make them branch into still more numerous ramifications: this operation should be repeated every winter, keeping at each digging, a little greater distance from the plants; the upright shoots must not be trimmed while in the nursery.

Pick plants of an equal size, and of an equal degree of healthiness; or, sort them into several lots of different sizes, and plant each of these lots in a place by itself.

The plants should be of the size of a man's little finger, or thumb. Plants reared in a rich nursery till they are of that size, and well dug, will advance with great vigour.

The plants must be set out early in the winter, and never after February, and when planting, cut off the top of the quick entirely with a sharp tool, and prune the roots but little.

Directions for the manner of planting.

Turn up a little of the earth from the place where the ditch is to be made, and lay it upon the bank reversed, so as to form a bed for the plant above two inches thick above the solid ground, upon this the thorns should be laid nearly in an horizontal position, but inclining a little upward in the point, and having the ends of the stems just equal with the face of the bank, or projecting beyond it very little more than half an inch. By this means, every plant will send out nearly one or two shoots, which will be the more vigorous, as there are so few of them. Supernumerary shoots must be trimmed close by the stem from which they spring, for it is the largeness of these original stamina of the hedge that will afterwards constitute its strength, and not the number of small ramifications, as is too generally imagined. An easier way still, is to rub off the supernumerary buds as soon as they begin to shoot in the spring.

The plants being thus regularly laid, should have their roots immediately covered with the best mould from the surface of the ditch, and the breast of the bank must be made up with the less fertile earth from the ditch.

Attention to the Hedge.

The first winter after planting, the hedge must be examined, and all stinted or dead plants removed, and their places supplied. For this purpose a stock of vigorous plants must be kept in the richest part of the nursery, and be well tended; the top must be cut off at planting, and rich earth put over them.

In the course of the growth of the hedge, the top must not be cut, but only the luxuriant side branches that spring out above, trimmed from time to time, so as not to be allowed to overshade those that may be below. The first clipping must be as near to the upright stem as possible; for as these side branches must always extend a little further at every cutting, if this caution is not observed, these lateral shanks will in time become naked; and the interval would form a very disagreeable void.

A hedge that has been stinted in its growth, from the poverty of the soil, or inattention to weeds, must be cut down in autumn or the beginning of winter to the height of an inch or two above the ground, kept free from weeds, and trained as above. All the buds of the sprouting stump must be rubbed off, excepting one or two of the strongest and best placed, which should be

left for a stem. An attention to this rule is of great consequence.

When a hedge has been neglected and gaps are formed, they must be filled by *plashing*. To do this, stems are selected, to be left at proper distances, the tops of which are all cut over at the height of four feet from the root. Straggling side branches of the other parts of the hedge are also lopped away. Several of the remaining plants are then cut over close by the ground, at convenient distances; and the remaining plants are cut perhaps half through, so as to permit them to be bent to one side. They are then bent down almost to a horizontal position, and interwoven with the upright stakes, so as to retain them in that position. The operator begins at one end of the field, and proceeds regularly forward, bending all the stems in one direction, so as that the points rise above the roots of the others, till the whole wattling is completed to the same height as the uprights, after which it assumes the appearance somewhat resembling that which is represented in the following cut.

All the diagonal wattlings continue to live, and send out shoots from many parts of their stems; and as the upright shoots that rise from the stumps of those plants that have been cut over, quickly rush up through the whole hedge, these serve to unite the whole into one entire mass that forms a strong, and durable fence.

Dr. A. recommends to plant in the shade, the *pyracantha*, evergreen thorn, between every second and third thorn, in order to render the hedge ornamental, also, the woodbine (honey suckle), hardy roses, and a few plants of the crab-tree.

The willow, lombardy-poplar, and whinns or furze, and alder, are also recommended by Dr. A. to form hedges. Thus far Dr. A.

Those who have it not in their power to procure live quicks, may soon obtain a stock, by ploughing up a cow-pen and sowing the haws therein; or by putting them in a barrel or box of rich earth, and

placing it under the eaves of a house until they sprout, or until upon examination it is found they are about to sprout; when they should be transplanted into a nursery of *rich* ground, and tended as above directed.

Mr. Montmollin of Philadelphia, has made a fair experiment with respect to the comparative merits of the English white thorn and the American black thorn, at his farm on the Wissahickon road, where the editor had the pleasure to see both growing. He procured his American quicks from New-Castle in the state of Delaware, near to which place thorns grow with great luxuriance. English thorns were planted round a part of the same field as the former, and the same care bestowed on both. The English thorn sheds its leaves two weeks before the American thorn, and though the former was planted two years after the latter, yet at present (1803) the American thorn is more forward in growth by the above period than the English. Mr. M. planted at eight inches apart, but thinks 12 inches a better distance, as the hedge grows very rapidly if well tended, and soon fills up the space between each plant. He plants them in a slanting direction, each plant leaning towards its next neighbour, as shewn in the cut before given.

Mr. M. also pursues the mode recommended by Dr. Anderson, in first setting out quicks in a nursery of rich land, and weeding them well; he however sets them out in the spring instead of the winter. He permits the plants to remain in the nursery, for two successive springs, and not only at the first planting, but in the two following springs he trims the plants to three or four eyes.

The difficulty attending the procuring of thorn plants, and the length of time the haws require to vegetate, will prevent the great bulk of American farmers of the present day from attempting to lay the foundation of a *rich inheritance* for their children by planting hedges of that tree, they are therefore informed that a hedge equally useful, and less troublesome than that of the thorn, may be formed of the honey locust of our country (*Gleditzia Triacanthos*) or of the white flowering locust, (*Robinia pseud-acacia.*) The seeds ought to be sown in a nursery and well weeded as directed in the case of the thorn, and when the plants are about a foot high, may be transplanted to the fence side. Mr. Montmollin has a fine hedge of the honey locust. It must be remarked, however, that the roots of both the above trees spread very rapidly, and render it necessary to run a plough every second year at the distance of two feet from the hedge, to divide the young roots, and thus stop their progress.]

HEDGE-HOG, the Common, or *Hystrix erinaceous*, L. is a quadruped, which is from nine to ten inches in length, the body is of an oblong form, entirely covered with sharp quills on its back, but with hair on the breast; the ears are broad, round, and short, and the eyes small and protuberant.

The females of these animals, after a gestation of seven weeks, produce four or five young ones, of a whitish colour, with only the points of the bristles appearing above the skin.

Hedge-hogs unnaturally devour

their offspring, and all attempts hitherto made to domesticate them, have proved ineffectual. They frequent woods, live under the trunks of old trees, in the chinks of rocks, or under large stones. Being of a timid disposition, they proceed only at night in quest of food, which consists of fallen fruit, roots, leaves, insects, &c. It is however, not founded on truth, that they extract the milk from the udders of cows; as the peculiar smallness of their mouth renders the act of sucking impracticable. They may be advantageously kept in gardens, where they will be of considerable service, by dovouring many noxious insects, especially moles, mice, and snails, which last they eat with great avidity. The flesh of these creatures is eatable.

HELLEBORE, or *Helleborus*, L. a genus of plants consisting of five species, two of which are natives of Britain: the principal of these is the *fœtidus*, Fetid Hellebore, Bear's foot, Ox-heel, or Setterwort. It grows in meadows, shady places, and hedges; producing green flowers, somewhat tinged with purple at the edges, which blow in the months of March and April.

In a recent state, this species has an extremely fetid smell, accompanied with a bitter taste, which is so remarkably acrid, as to excoriate the mouth and fauces. A decoction of it is, by country people, employed as a cathartic, for which purpose one or two drams are fully sufficient. The dried leaves of the fetid hellebore are sometimes given to children as a vermifuge; but as their operation is so violent, that a large dose might easily prove fatal, this virulent plant ought to be employed only by farriers. Beside immediate vomiting, the most proper *antidotes* to every species of the hellebore, are mucilaginous drinks in very large quantities; such as the decoctions of oatmeal, pearl-barley, linseeed, marsh-mallows, &c. or milk and water; after taking which, the poisonous matter will be most effectually counteracted by diluted vinegar, juice of lemons, or other vegetable acids.

HEMLOCK, or *Conium*, L. a genus of plants comprising five species; one of which is a native of Britain, namely, the *maculatum*, Common Hemlock; or Kex, a biennial plant, growing in hedges, orchards, rubbish, on cultivated ground and dunghills: it flowers in the months of June and July. Its stalks is more than a yard high, sometimes an inch thick, hollow, marked with many dark-red spots, and knotty; its umbels consist of numerous small white flowers, and the fruit resembles aniseed, but has an unpleasant taste. The whole plant is poisonous; though its leaves were formerly often employed in schirrous tumours of the breast, and cancers; in which painful disorder, though it may not in every case effect a cure, it is a very useful medicine, when duly prepared and administered.

As the Common Hemlock, however, is one of the most deleterious vegetables of this climate, we advise the reader to refrain from medling with this precarions medicine, and to intrust its preparation to professional hands. If inadvertently taken, this species, as well as the two following kinds of the hemlock, require similar antidotes and treatment with the Hellebore, of which we have treated in the preceding article.

Hemlock, the Lesser.......See Fool's Parsley.

HEMLOCK, the Water, *Phellandrium*, L. a genus of plants consisting of two species, one of which, the *aquaticum*, Water Hemlock, or Horse-bane, is a native of Britain. It grows in rivers, ditches, and pools: and flowers in the month of June and July. This species is eaten by horses, sheep, and goats, but swine do not relish it, and it is totally refused by cows. It is considered as a fatal poison to horses, which on eating it become paralytic: this affection is occasioned by an insect called *curculio paraplecticus*, which is generally found within its stems; the usual antidote is the dung of pigs, which ought to be given to the animal as early as possible.

The leaves of the horse-bane are sometimes employed in discutient cataplasms; its seeds are recommended in intermittent fevers and pulmonary consumptions, but ought to be prescribed by the faculty.

HEMLOCK, the Long-leaved Water, or Water Cow-bane, *cicuta virosa*, L. is an indigenous perennial plant, growing on the sides of pools and rivers; flowering in the month of August. It is likewise one of the most virulent vegetable poisons; its root is large, hollow, and contains a very acrid milky juice that soon changes to a saffron-colour, and has a nauseous taste, somewhat similar to that of parsnip: the stem attains a height of four feet. Early in the spring, when it grows in the water, it is frequently eaten by cows, which are inevitably killed by it; but, as the summer advances, its scent becomes stronger, and they carefully avoid it. Yet, though it is thus fatal to cows, it is eaten with safety by horses, sheep, and goats, which last devour it with avidity.

[Two species of Cicuta are natives of the United States, viz. *C. bulbifera*, with white flowers, and *C. maculata* with a purple spotted stem, and black flowers. They are highly poisonous.

Hemlock Spruce. See Pinus.]

HEMP, the Common, or *Cannabis sativa*, L. a valuable plant, which grows wild in the East Indies, and is cultivated to a very considerable extent in Britain, particularly in the counties of Sussex and Suffolk. It thrives most favourably on a sandy, moist loam, or on old meadows and low bottoms near rivers, and is propagated from seed, which is sown in the proportion of eleven pecks, or two bushels per acre, broad-cast; though a much smaller quantity will suffice, if it be drilled. The proper time for sowing hemp, is from the middle to the end of April, or even a month later; but the best crops are generally produced from the ealier seeds.

This useful plant requires no weeding; the male, or *fimble* hemp, is usually fit for pulling in the middle of July, or about nine weeks after it is sown. The female, termed *harle*, or seed-hemp, is seldom ripe till September, when it is *pulled*, tied into bundles, and set to dry: at the end of ten days they are loosened, and the heads or tops are held upon a hurdle by one person, while another, with a small threshing flail, beats out the seed.

The hemp is then prepared for the manufacturer, either by *grassing*, that is, lying on stubble or pasture ground, in order to be

gradually *dew-ripened*, or, by *water-rotting*, for which process clay-pits are preferred to running-water. In these, the hemp is immersed in bundles, laid both directly, and across, thus,

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for four or five days, according to the fineness of the weather. The next operation is that of *reeding*, namely, the separation of the bark from the *reed*, or woody part, which is effected either by pulling out the reed with the hand, or by drying, and breaking it by machinery, like flax. The hemp is then cleared of its mucilaginous matter, by pouring water through it, and squeezing out the liquid after every affusion, till it be completely divested of those particles.

The next operation is that of *breaking* it, which, in the county of Suffolk, is performed with the aid of certain machinery worked by the hand; when the hemp is beaten in mills; combed or dressed by drawing it through *heckles*, similar to the combs of wool-manufacturers; and spun into thread, whence it is made into twine, cordage, cloth, netting, &c.

Beside the strong cloth, and other articles made from it, hemp is of considerable utility for other purposes. The refuse, called *hemp-sheaves*, affords an excellent fuel; and the seeds yield by expression a pure oil, which is peculiarly adapted for burning in chambers, as it is perfectly limpid, and possesses no smell. Another valuable property of hemp is, that it effectually expels vermin from plantations of cabbages; for, if it be sown on the borders of fields, &c. planted with that vegetable, no caterpillars will infest it.

When fresh, hemp has a strong, narcotic smell: the water in which it has been soaked, is said to be in a high degree poisonous, and to produce fatal effects, immediately after drinking it. The seeds have an unctuous, sweetish taste; they may be triturated with water, or boiled in milk as an emulsion, which is occasionally taken as a domestic remedy in coughs, heat of urine, and similar complaints.

There is another species of hemp, called *Chinese Hemp (Crotolaria juncea)*, which was introduced into England, from India, in the year 1783, when various experiments were made with little success; though they fully proved that the plant will perfectly succeed in this climate. The most remarkable of the statements which have been published, is that communicated by the Rev. Dr. Hinton, of Northwald, near Brandon, Suffolk; on whom the "*Society for the Encouragement of Arts*," &c. in 1788, conferred the silver medal. This gentleman received some seeds from the Secretary of the Society, in 1786, which were sown on the 17th day of May, and the plants appeared on the 16th day of June. They were few, and sickly; and, notwithstanding several favourable showers, they continued to languish so much, that the experiment was entirely abandoned, and buck-wheat was harrowed into the ground for a fallow-crop. In the beginning of October, however, the persons employed in cutting the buck-wheat, discovered some

seed in the heads of a few straggling hemp plants, which had been suffered to grow among the crop, and which, after being carefully threshed, produced three pints of tolerably good seeds. On the 10th of May, 1787, they were sown on a small piece of good soil: in the course of 9 days the young plants came up, and were suffered to grow till August, when they were pulled. The produce of pure hemp weighed at the rate of 95 stone 7 pounds and 12 ounces per acre, beside three bushels, two pecks, and half a pint of seeds that were saved; which is upwards of one-third more than the best crops of English hemp have ever been known to yield.

In the Eastern climates, hemp-leaves are used like opium, and possess similar intoxicating properties. The Russians and Poles, even of the higher classes, bruise or roast the seeds, mix them with salt, and eat them on bread..... Birds, kept in cages, are likewise fond of this oily seed; but they should not be indulged in its constant use, which is apt to render them prematurely old, blind, and at length consumptive.

Hemp being an article of extensive utility, various vegetables have been discovered, which may serve as substitutes. Among these are the Canada Golden-rod, or *Solidago Canadensis*, a perennial plant, that might be easily cultivated in Britain: its stalks are numerous, straight, and grow above five feet in height; they afford very strong fibres, if treated in the same manner as hemp. The sun-flower, or *Helianthus*, L. also affords single filaments or fibres, which are said to be as thick, and in all respects as strong, as small pack-thread.... See also NETTLE.

HEN, the female of the COCK, (*Phasianus Gallus*), an useful domestic bird which lays eggs, and produces one, and sometimes two broods of chickens in one year.

If well fed, and allowed to roam in a farm-yard, a good hen will deposit, in the course of twelve months, above 200 eggs. She prepares her nest without any care, either among bushes, or by scratching a hole in the ground; the time of hatching is preceded by a clucking noise, and the animal's discontinuing to lay eggs. Ten or twelve chickens being the greatest number that a good hen can rear and clutch at a time, various methods have been devised for obtaining young broods by artificial means, of which we have already treated under the article HATCHING.

Capons may easily be taught to clutch a fresh brood of chickens; First, the fowl is made so tame, as to feed from the hand; on the approach of the evening, the feathers are plucked off his breast; the bare skin is rubbed with nettles; and the chickens are then placed beneath him. This expedient is repeated two or three nights in succession, till the animal conceives an affection for the young birds thus committed to his charge: when one brood is grown up, another nearly hatched may be placed under him, in the manner above directed; and he will treat them with the same tenderness as the real parent.

HEN-BANE, or *Hyoscyamus*, L. a genus of plants comprising nine species, one of which is a native of Britain, namely, the *niger*, or Common Hen-bane. It abounds in vil-

lages, road-sides, and among rubbish; and flowers in the month of July. Neither horses, cows swine, nor sheep, will touch this plant, though the animals last mentioned are supposed to eat it when young: it is not relished by goats.

The seeds, leaves, and roots of the common hen-bane, taken internally, are reputed to be poisonous; and numerous instances have been recorded of their virulent effects. The general consequences of eating them are, convulsions, madness, and death; though Dr. SMITH states that he has eaten the *seeds* with impunity. The leaves, if scattered about a house, are said to drive away mice and rats: when bruised, they emit an odour resembling that of tobacco, and are so powerfully narcotic, that their exhalation occasions the head-ach and giddiness. The whole plant is fatal to poultry; it intoxicates hogs; but cows, horses, dogs, and goats, are able to bear a tolerable portion before they are affected. In superstitious ages, the famous *sorcerer's ointment* was prepared from the leaves of the hen-bane, which produced a kind of delirious trance, or furious inspiration, on those who were anointed with this poisonous salve. Malignant persons, even in modern times, appear to be well acquainted with the properties and effects of the hen-bane: and the iniquities lately practised in a village near Newport, Salop, with a preparation of this powerful plant, almost exceed belief; especially as they were directed by one branch of a numerous family against another, not even excepting infants. When suspicions arose against those miscreants who were guilty of secretly mixing this baneful vegetable with ale and beer, they had the inhuman audacity to introduce the poison between the soles of the shoes; and after these were secured, between the seams of shirts that were suspended on the hedge. We have mentioned these flagrant instances of depravity, in order to caution the credulous reader, and to shew that the extraordinary effects of this poisonous application arise from natural causes, and ought not to be ascribed to witchcraft, as was unfortunately the case in Shropshire, till the whole mystery was satisfactority explained. The writer of this article, having contributed to detect the delusion, thinks it his duty to warn the public against certain grave and whimsical matrons, as well as old men lurking about country places, who, under the pretence of fortune-telling, and amusing the harmless listeners with spell craft, cunningly enter into the secret history of different families, avail themselves of the most powerful herbs, and thus become subservient to the most nefarious purposes.

Notwithstanding these virulent properties, the hen-bane has lately been employed with considerable success in the most obstinate diseases, such as epilepsy, internal spasms, madness and melancholy; though we trust that no circumspect person will ever resort to its use, without consulting a medical friend. If, however, any small portion of the leaves should have been accidentaly swallowed, brisk emetics, ought to be instantly taken; and after discharging the contents of the stomach, it will be necessary to administer emollient and oily clysters, to repeat them as often as they are ejected, and to drink as large portions of vinegar or juice

of lemons diluted with water, as the stomach is able to support.

In recent cases, where the poisonous ointment of hen-bane has been absorbed by the skin, mild sudorifics, joined with mercurial frictions, will then be very proper; in order to excite a slight salivation, and expel the virus; but, if some time after the accident has elapsed, and the patient become delirious, paralytic, consumptive, or blind, recourse must be had to professional advice.

HEN-PIT. See Fetid HORE-HOUND.

HEN-HARRIER, DOVE-COLOURED FALCON, or BLUE HAWK, *Falco Cyaneus*, L. a native bird, found chiefly in the northern parts of Britain. It is about 18 inches in length; the female breeds annually on the Cheviot Hills, and other precipices in that neighbourhood; and makes her nest on the ground, where she deposits four eggs.

The hen-harrier flies low, skimming along the surface of the earth in search of its prey, consisting of lizards, reptiles, and birds, especially poultry; among which it commits great depredations.

HEN-MOULD-SOIL, in agriculture, a term used in some parts of England to denote the black, mouldering, hollow, spongy earth, which is usually found at the bottoms of hills. It is better calculated for grazing, than for the culture of grain; because it does not adhere sufficiently close to the corn to keep the stalks firm, while growing; or, if it appear to thrive, the growth is generally coarse, and yields abundance of straw, but little in the ear. This soil possesses too much moisture, arising from a bed of stiff clay, which prevents the discharge of the water into the lower strata, so that the crop becomes uncommonly rank.

In other parts of Britain, the appellation of *hen-mould* is given to a black, compact earth, streaked with white mould. This soil is very rich and fertile, producing the finest wheat.

HENTINGS, a term used by farmers to express a particular method of sowing grain before the plough, so that the seed is cast in a straight line, which is followed by the plough, and thus completely covered. This method of sowing is supposed to save a considerable quantity of grain, as well as to lessen expense; because a dexterous lad is fully competent thus to scatter the seed with the same regularity as the most skilful husbandman.

Hepar Sulphuris. See Liver of SULPHUR.

HEPATIC ALOE, the inspissated juice of the common aloe, a native of Barbadoes, and other West India islands. Its smell is much stronger, and more disagreeable, than the Socotrine aloes; the taste is uncommonly bitter and nauseous. The best hepatic aloe comes from the island of Barbadoes, in large gourd-shells; an inferior sort, which is in general soft and clammy, is imported in casks. For an account of its medicinal properties. See ALOE.

HEP-TREE. See DOG-ROSE.

HERB, a name given to all plants, the stalks or stems of which perish every year, after their seeds have attained to maturity.

Herbs are usually divided into two classes: 1. Those, the roots of which decay together with the stem; and 2. Those, whose roots

vegetate in the ground for several years.

The former class is subdivided into 1. *Annuals*, or those plants which arrive at maturity the first year, and entirely perish, immediately after they have shed their seeds; such are wheat, rye, barley, &c. 2. *Biennials*; and 3. *Triennials;* namely, such as yield fruits and flowers the second or third year, and then decay: of this nature is the Garden Angelica, and some other plants.

Those herbs which do not decay after they have shed their seeds, belong to the latter class, and are called *perennials;* some of them lose their verdure, and continue bare during part of the year, such as colt's-foot, &c. while others retain their leaves the whole year, whence they are called *evergreens;* such are the holly, fir, &c.

Herbaceous Plants are such as are furnished with succulent stems or stalks, creeping along the ground every year. They are divided into similar classes with herbs, and those which merit more particular notice, are treated of in their alphabetical series.

HERBAL (*Herbarium*,) generally speaking, signifies a book, containing a methodical arrangement of the classes, genera, species, and varieties of plants, together with an account of their properties. It is also applied to a *hortus siccus*, or dry garden; an appellation given to a collection of specimens of plants carefully dried and preserved.

Among the different methods adopted by botanists, for obtaining a *hortus siccus*, the following appear to be the most practicable:

1. Lay the plants flat between papers; then place them between two smooth plates of iron screwed together at the corners: in this state they are to be commited to a baker's oven for two hours. After being taken out, they must be rubbed over with a mixture consisting of equal parts of brandy and aquafortis, then pasted down on paper with a solution of gum-tragacanth in water, after which they are to be laid in a book, where they will adhere, and retain their original freshness...Although this process was suggested by Sir R. SOUTHWELL, in the 237th Number of the *Philos. Trans. of the Roy. Soc.* yet the following method is more simple:

2. Flatten the plant, by passing a common smoothing iron over the papers between which it is placed; and dry it slowly in a sand-heat. For this purpose, the cold sand ought to be spread evenly, the smoothened plant laid gently on it, and sand sifted over so as to form a thick bed; the fire is then to be kindled, and the whole process carefully watched, till the plant is gradually and perfectly dried.... Thus, the colour of the tenderest herb may be preserved, and the most delicate flowers retain all their pristine beauty.

3. Another, and far more complete method, was suggested by the ingenious M. WHATELY; and bears a slight resemblance to that last specified. He directs those who intend to follow his plan, previously to procure....1. A strong oak-box of the same size and shape as those employed for packing up tin plates: 2. A quantity of fine sifted sand, sufficient to fill the box: 3. A considerable number of pieces of pliant paper, from one to four inches square; and, 4. Some

small flat leaden weights, and a few small, bound books.

He then directs the specimen of the plant intended for the herbal to be gathered, when dry and in full bloom, with all its parts as perfect as possible, and conveyed home in a tin box, well secluded from the air. The plant is first to be cleared from the soil as well as the decayed leaves, and then laid on the inside of one of the leaves of a sheet of common cap-paper. The upper leaves and flowers are next to be covered, when expanded, by pieces of the prepared paper, and one or two of the leaden weights placed on them. The remainder of the plant is now to be treated in a similar manner.

The weights ought next to be gently removed, and the other leaf of the sheet of paper folded over the opposite one, so as to contain the loose pieces of paper and plants between them. A book or two is now to be applied to the outside of the paper, till the intended number of plants is thus prepared; when a box is to be filled with sand to the depth of an inch, one of the plants put in, and covered with sand sufficient to prevent the form of the plant from varying. The other plants may then be placed in succession, and likewise covered with a layer of sand, one inch thick between each; after which the whole is to be gently pressed down in a greater or less degree, according to the tenderness or firmness of the plants.

The box is next to be carefully placed before a fire, one side being occasionally a little raised, as may be most convenient; the sides being alternately presented to the fire, two or three times in the day; or, the whole may be put into an oven gently heated. In the course of two or three days, the plants will be perfectly dry, when the sand ought to be taken out, and put into another box: the plants should likewise be removed to a sheet of writing paper.

This method of preserving plants, Mr. WHATELY states to be preferable to every other, as both the flowers and leaves, if kept loosely within the paper, in a dry room, without being exposed to the air, will retain their beauty for several years. It will, however, be necessary to inspect them once in the course of a year, for the purpose of destroying any small insects, that may accidentally breed among the plants.

HERB-BENNET. See Common AVENS.

HERB-CHRISTOPHER. See CHRISTOPHER, the Herb

HERB-GERARD. See GOUT-WEED.

HERB-PARIS, or TRUE-LOVE, ONE-BERRY, or FOUR-LEAVED TRUE-LOVE, *Paris quadrifolia*, L. an indigenous plant, growing in woods and shady places, and flowering in the month of May or June.

The dark, brown berries of this plant, possess a narcotic smell, and are fatal to poultry. If inadvertently eaten by children or adults, they occasion vomiting and spasms in the stomach. The expressed juice of the berries, however, is said to be useful in inflammations of the eyes; and both the leaves and berries possess similar properties with opium. According to LINNÆUS, the root of the Herb-Paris may be employed as a substitute for Ipecacuanha; for it excites vomiting, if given in a double proportion. BOHMER remarks,

that the dried leaves impart a fine yellow colour to yarn or linen-cloth, which has been prepared in alum-water.

HERB-ROBERT, or FETID CRANE'S-BILL, *Geranium Robertianum*, L. an indigenous annual plant, growing on walls, hedges, rubbish, and stony places; flowering from May to October. This herb is in great repute among many farmers, for its efficacy against the staling of blood, and the bloody flux in cattle; in which cases it is said to be preferable to most of the remedies used on such occasions.

In Germany, the Herb-Robert is employed in the process of tanning; and DAMBOURNEY obtained from this, as well as all the other species of Geranium, a more or less durable yellow dye.

HERB-TWO-PENCE. See CREEPING LOOSE-STRIFE.

HERON, the COMMON, or *Ardea major*, L. a predatory bird, which has a small lean body, but is provided with long legs, and a sharp-pointed bill.

The male heron is a very elegant bird; its forehead, crown, and upper part of the neck, are white; the head is adorned with a pendent crest of long black feathers; beneath the covers of the wings it also has a fine black plumage. The female, however, is not so handsome; she builds her nest either in trees, or in high cliffs over the sea, and forms it of sticks lined with wool: in the month of February, she deposits five or six large eggs of a pale green colour.

Herons were formerly much esteemed as a delicacy at the table, but their flesh has a strong taste of fish. They attain an age sometimes exceeding sixty years, and are very great devourers of fish, so that they occasion more mischief in a pond than otters. One heron will swallow fifty dace or roaches of a moderate size in a day; and it has been known to devour a thousand store-carp in a year.

When it is ascertained that one of these rapacious birds visits a fish-pond, he might be taken in a manner similar to that practised in catching pike. For this purpose, three or four small roach, or dace, are to be procured, and each should be fastened on a wire, with a strong hook at the end; the latter must be connected with the wire just below the gills, and passed immediately under the uppermost skin to the tail. Thus, the fish will be preserved alive for several days; a precaution which is essentially necessary; because, if dead, the heron will not attempt to bite. Next, a strong line about two yards long is to be prepared of silk and wire twisted together, one end of which should be fastened to the wire connected with the hook, and the other to a stone of about a pound weight: .....three or four of such baits being placed in different shallow parts of the pond, it is very probable that the mischievous bird will be speedily taken by this stratagem.

HERRING, or *Clupea harengus*, L. a well-known fish, generally about seven or eight inches long, though it sometimes grows to the length of a foot: it has four gills, the fibres of which are remarkably long, and open very wide, so that this fish almost instantly dies, when taken out of water.

Herrings are found in great abundance, from the highest northern latitudes, down to the northern

coast of France. They are also met with in the Yarmouth seas from the end of August till the middle of October; and are in full roe about the latter end of June, whence they continue in perfection till the beginning of winter, at which season they deposit their spawn.

Among the various methods employed for salting or curing herrings, and sprats, we shall briefly notice one invented by Mr. BENJAMIN BATLEY, of Streatham, Surrey, merchant; for which he obtained a patent in September, 1800. After severing the head, and taking out the entrails of the fish, he salts the body with bay, rock, or common salt (if not sufficiently salted as *sea sticks*), preferring, however, the bay or rock salt to the common, which is apt to absorb the pickle, and occasion the fish to *rust*. The patentee then prepares a pickle, consisting of one pound of bay salt, four ounces of salt-petre, from two to four pounds of molasses, and a gallon of spring-water; which is boiled till the other ingredients are dissolved. The herrings are then packed as usual in a cask; between every layer of them he sprinkles a small portion of salt, and also of pickle, to cover the fish; but leaves three inches of the head of the cask unstowed, in order to fill up that space with the pickle. When headed up, a cork-hole may be bored either in the head or centre of the cask, by means of which more pickle may, when necessary, be introduced, for the preservation of the fish. With respect to the mode of curing sprats, the process differs in some particulars; and those who wish to acquire more minute information on this subject, we refer to the 14th volume of the *Repertory of Arts and Manufactures*.

[The IMMENSE WEALTH which the Dutch derive from the herring fishery, is well known to every person who has paid attention to the subject of the wealth of nations, or is acquainted with the history of the above mentioned people. This fishery has been emphatically styled the *Dutch Gold Mine*, and such indeed it has proved to them. The coasts of the United States are annually visited by herrings, and though not of the same quality as those caught by the Dutch, yet there can be no doubt of the possibility of improving their natural good qualities. by the same attention which is paid by the Dutch. That it is to the mode of curing, more than to the original flavour of the fish, the peculiar excellence of the Dutch herrings is, owing, is proved by this fact, viz. that the English do not prepare herrings of equal quality with the Dutch, though the fish are caught on the same coast:.....viz. on that of Scotland.

A conviction of the importance of this trade to the United States, has induced the Editor to take pains to investigate the subject, and to abridge the scarce and valuable pamphlet published by the patriotic Earl of DUNDONALD, who has detailed the Dutch regulations, and their mode of procedure: and the Editor will have great pleasure in thinking, that he has rendered an essential service to his country by so doing.

" The Dutch oblige the fishermen, by law, to separate the herrings caught in one night from

those caught in another, and to take them off Fair Hall, or Scotch Coast, after St. John's day (June 24). No herrings are allowed to be shipped after the 15th of July. The herrings first taken are not to be sold, unless they have been ten days in pickle. The *curing* of the herrings must be completed three weeks after they arrive, and be re-packed more than once, according to the nature of the herring. No herrings are suffered to be re-packed or heightened with fresh pickle but in the public streets, or customary places, with open doors. The different sorts and sizes of herrings, must be kept separate, and the large barrel herrings to be salted in no less proportion than *four barrels of salt to every last* (12 *barrels*); the herrings to be properly gutted, and laid cross-wise in the barrel. *They prohibit all salt being used except that from Portugal or Spain.*

The gills, liver, and stomach, are the only parts that are torn away. The long gut, to which a fat membrane adheres, is drawn a little out of the body of the fish, and is left pendent. As soon as gutted, the fish should be salted with the above quantity of Spanish, Portugal, or best purified salt, and laid close in the barrel, in a *direction contrary to the one immediately below*. When the barrel is full, it is to be coopered up, and stowed in the hold. The barrels should be tight. Fourteen days is sufficient for the fish to pine in the first salt or pickle, *provided* the salt be *small;* but when great salt is used, it may require three weeks or a month.

The *Curing* of herrings, is a distinct process from that of salting, and is necessary to prevent the tendency which the bloody liquor or brine has to putrify, and consequently to spoil the fish.

Curing...After the herrings have been salted as directed, and have remained a sufficient time in salt to pine, or throw their liquor, empty the barrels containing the herrings upon a large dresser, with a ledge or moulding round it, and inclined one way, to allow the brine to run into a hogshead or vessel placed to receive it: put the brine into a large hammered iron pan or cast metal boiler, let it boil, skim it, draw off the liquor, and when skimmed into a wooden vessel, let it cool.

Take the milts of thirty herrings for every barrel proposed to be cured; bruise them in a mortar, add of the liquor as you proceed, and when sufficiently disolved, and in the state of a rich emulsion or saponaceous liquor, mix it with the boiling liquor in the wooden vessel; then lay the herrings in the barrel; with a layer of salt betwixt each row, in the same manner as directed in the salting of them: cooper up the barrels, and fill them with the prepared liquor at the bung hole, or at the hole in the end of the barrel.

The causes to which the superiority of the Dutch herrings are attributed by the Rev. Herbert Marsh, are as follow....See *Dublin Soc. Trans.* vol. 1. part 2d.

1. The attention to the proper quantity of salt so as neither to render the fish too salt, nor to endanger their spoiling, from using too small a quantity.

2. To the quality of the salt employed.

3. To the sorting of herrings before they are salted the second

time, by the fish wardens after they are brought into port.

4. To the mode of treating them when first taken. They are never exposed uncovered to the open air: but when drawn out they are thrown into pickle and then gutted, salted and packed, and if any remain when they shoot the nets again, they cast that remnant overboard as unfit for use: hence arises that uniform equality observed in the Dutch herrings.

Mr. MARSH computes, from allowable data, that one hundred and thirty thousand barrels of herrings, are consumed every year in Germany; to this must be added the immense quantity consumed in the Dutch provinces, and the portion exported, and thence an idea may be formed of the great value of the trade. To purify salt, see that article.]

HESSIAN FLY:....See FLY, the *Corn*. [and WHEAT.]

HICCOUGH, or HICCUP (*Singaltus*), a sudden convulsive motion of the stomach, occasioned by various causes, such as a fit of laughing, thirst, cold drinks, suppression of diarrhœa, antipathy, &c. It can by no means be considered as a disease, though a few instances have occurred, in which it has continued for three or four years; and one in which it became habitual, and could not be removed.

Persons who eat large meals, and load the stomach by drinking profusely after them, or those liable to flatulency, are chiefly subject to this affection.

The common hiccough seldom requires any medicine to remove it, as it generally disappears after drinking a few small draughts of water in quick succession; but, when it becomes very troublesome, a table spoonful of vinegar may be swallowed. In several very obstinate cases, simple peppermint-water acidulated with a few drops of vitriolic acid, has procured immediate relief. Vomiting; sneezing; the application of cupping glasses, or aromatics to the pit of the stomach; the stench of an extinguished tallow-candle, and many other remedies, have occasionally been resorted to with success. We are informed by a correspondent, that a firm ligature on the artery at the wrist, will afford relief, if it be continued for about one minute; but, if the first attempt should not prove successful, he recommends it to be repeated; when such convulsive efforts will, in general, be suppressed. In children, or nervous adults, sudden joy or fright, or the promise of an acceptable present, is often equally efficacious.

[HICKORY, a well known native forest tree of the U. S. of the genus *Juglans*, L. MARSHALL in his "*Arbustrum Americanum*" enumerates the following varieties of this species.

"1. *Juglans alba acuminata*, long sharp fruited hickory tree. The kernel of the nut is small and not sweet.

2. *J. alba minima*, white, or pignut hickory. The fruit of which is small and round, and covered with a very thin husk, or covering, opening in divisions. The shell of the nut is also thin, and the kernel plump, but very bitter. The timber of this is not much esteemed. The late Dr. JOHN PENNINGTON recommends the pignut as an astringent.

3. *J. alba odorata*....The nuts are small, round, and the kernel sweet. The timber is hard and

tough, and used for axle-trees for carriages, mill cogs and rounds, and also for handles, &c. for most implements of husbandry.

4. *J. alba ovata.* Shell barked hickory. This tree delights in a moist rich soil. The fruit is roundish, but rather flatted, and indented at the ends. The shell is thin, and contains a highly pleasant kernel, preferable to the other kinds. There are several varieties of this in America, some with nuts as largs as our common walnut"..... These should be carefully preserved, as they yield, together with the hickory nut, a very fine oil, which has been expressed from the bruised nuts, and found superior to the olive oil for table use.]

HIDE, generally speaking, signifies the skin of beasts, but is particularly applied to those of large cattle, such as bullocks, cows, horses, &c.

Hides are either raw or green, that is, in the same state as when they were taken off the carcase; salted or seasoned, in which case they are dressed with salt, alum and salt-petre, to prevent them from putrifying; or they are curried or tanned; for an account of which process, the reader will consult the articles CURRYING and TANNING.

In August 1783, a patent was granted to Mr. GEO. CHOUMERT, of Five-foot-lane; Bermondsey-street, Surrey, tanner, for his invention of a machine for cutting, splitting, and dividing hides and skins, both in the *pelt*, and after being dressed into leather, for separating the grain from the flesh-side. As, however, this patent, though expired, cannnot be understood without a plate, and is, besides, not immediately connected with domestic economy, we refer the inquisitive reader to the 4th vol. of the *Repertory of Arts and Manufactures.*

Another patent was granted in May 1801, to Mr. THO. BAGNALL, of Worsely, Lancashire, for a mill or machine for *beaming* or working green hides and skins out of the mastering or drench, and preparing them for the ouse or back liquor, and also for chopping, grinding, riddling and pounding bark, and for other purposes. This machine may be worked by wind, water, steam, or any other power; but for the reasons before stated, we again refer the curious reader to the 15th vol. of the work above cited.

HIDE-BOUND, in farriery, a disorder to which horses, or other cattle are subject. It is known by the rigidity of the skin which apparently adheres to the animal's ribs, without the least partial separation. The horse is generally languid, dull, heavy, and weak; his excrements are dark, foul, and offensive; he falls into profuse sweats on every little exertion; and his whole appearance indicates great weakness.

Want of proper care, and bad food, such as rank long grass in swampy situations, and musty hay or oats, are the most probable causes of this affection. Few directions, therefore, will suffice, as the case is rather a temporary inconvenience than a disease. The animal should first lose a little blood, in order to induce a slight change in the circulation, which should be increased by giving him, three or four hours after blood-let-

ting, a mash of equal parts of malt, oats, and bran. This mixture ought to be repeated every night for two weeks, during which period two ounces of sulphur are to be stirred in, every second night: the animal's regular diet ought to consist of equal parts of oats and bran, with a pint of old beans in each, to prevent the mashes from relaxing his body. Besides, it will be required to give him regular dressing, air, exercise, sound oats, sweet hay, and plenty of good soft water; by means of which he will speedily recover.

Hide-bound, is likewise an appellation given by husbandmen to those trees, the bark of which adheres too closely to the wood, and obstructs their growth. The most simple remedy that suggests itself on the occasion, is, to cleanse the bark properly with a brush, [dipped in soap] and make slight incisions, longitudinally, round the whole stem; yet this operation will be most advantageously performed in the vernal months, or early in the summer. [See Apples.]

[HIVES, See Croup.]

HOARSENESS, a dimunition of the voice, generally attended with an unnatural asperity and harshness. It arises, mostly, from defects in the larynx and windpipe; from an ulcerated or ossified state of those parts; or from the acrimony of the bile: and it is not unfrequently a concomitant of catarrhous coughs, and scorbutic affections.

Lubricating medicines ought first to be administered, in order to obtund the acrimony of the humours, and to relax the strictness of the glandular parts. For this purpose, mucilaginous broths; decoctions or infusions of emollient vegetables, such as the dwarf, common, and marsh-mallows; and the syrups of hedge-mustard or horse-radish, will be found eminently serviceable.

If hoarseness be the consequence of a Cough (which see,) the removal of that complaint will restore the voice to its natural tone. In every instance, however, the bowels ought to be kept regular; and, if scorbutic affections be the cause of hoarseness, it will again depend on the removal of the disease, which pervades the whole system. Where this complaint is inveterate, tonics, attenuants, and expectorants, have frequently been found of service.

In many recent cases, however, the most speedy relief will be obtained by bathing the feet in warm water for about half an hour, previously to retiring to rest; when by a few days temperance in diet, and by carefully avoiding to take cold, this troublesome affection will gradually diappear.

HOE, or How, a well known implement of husbandry, designed for eradicating weeds from gardens, fields, &c. This tool is of great utility, and ought to be more frequently employed in stirring the unoccupied corners and spots of land, during the more vacant seasons of the year, by which operation the soil will be considerably improved.

To facilitate this important object, we shall present to our readers several hand-hoes, much superior to those in common use, and which, from their simplicity, deserve to be more generally known.

The first is the *Portuguese Hoe*, lately described and recommended by the patriotic Lord Somerville, and of which the following is a representation:

ET has judiciously availed himself of a short handle, and heavy iron work, the exact reverse of the common hoe, which requires great exertion to make any impression on the soil (excepting on the lightest sands,) especially if it has become dry and hard.

The handle of this implement is from three feet to three feet four inches in length; and, as it is both light and short, it is peculiarly calculated for strong lands and mountainous situations: because the hoe, by its weight and pointed form, cuts deeply into the earth, without requiring much exertion.

The second is the *Horse-shoe Hoe*, invented by Mr. MARK DUCKET, of Esher Surry:

This hoe is furnished with a ring or loop, as above represented, near the bottom of the handle, for holding a strap, which is fastened round the waist of the persons at work, as they walk backwards. It is eminently useful for cleaning crops of every description, whether *drilled* or *hand-set* in rows. Mr. DUCKET has judiciously availed himself

It is evident from the preceding cut, that Mr. DUCKET's hoes by their *convex* form, earth up as well as down; though the same implement may also be made with *straight* edges; namely, for drilled or dibbled crops at six inches interval; for clearing pease, beans, &c. at 18 inches distance; and for dressing crops of any description, at 12 inches interval. Should these hoes, however, from their *straight* edge, be unequal to cope with stiff

land, Lord SOMERVILLE suggests the expediency of adopting the *conical* edge (or the edge opposite to that in the horse-shoe hoe) which will remarkably increase their power. Lastly, his lordship observes, that *three* flat hoes at six inches; *two* flat ones at twelve inches; and *three* horse-shoe hoes, form the whole number requisite: and that they all screw into the same frame and handle.

The last hand-hoe, we shall notice, is constructed on an improved principle, by Mr. JAMES M'DOUGAL, now of Oxford-street, London; for which the *Society for the Encouragement of Arts*, &c. in 1793, conferred on him a premium of twenty guineas. This contrivance, which is represented in the annexed cut.

consists of two principal parts: the first of them is a beam of wood, which, at its fore-end, has a semicircle, forming two handles, between which one man walks and draws the implement forward. At the other end, this beam is divided and moves on two small gudgeons, by which it is accommodated to the height of the hands of the person drawing, and room is allowed for the movement of a wheel.

The farther end of the opposite beam is held by another person, who guides the hoe, and regulates the depth to which it penetrates the ground, while he at the same time assists its action by pushing it forward. The fore-end of this beam is also divided so as to admit a wheel to run between the sides, which serves to adjust the depth, and to ease the draught, in working the implement.

Mr. M'DOUGAL's hoes are made of cast-iron, and fixed in a mortice in the hinder beam, by means of a proper wedge: they may be made of different forms or dimensions, in proportion as is required by the peculiar nature of the work.

The design of this contrivance is to clear land from weeds, and to loosen the soil in the intermediate spaces of pulse or grain sown in equi-distant rows, while the plants are at the same time sufficiently earthed up, in consequence of which they vegetate with increased luxuriance.

It is calculated to effect these objects in an eminent degree, and from the simplicity of its construction, and the facility with which it is worked, it claims the attention of all agriculturists.

[The editor has used an earthing hoe fixed in a beam, exactly like Mr. M'D's. with great advantage.

But when the mere destruction of weeds is required, Mr. Johnson of Brunswick, New Jersey, takes out the hoe and introduces an instrument called in England a *scuffle*, which cuts the roots under the surface, and deposits the earth in its original place again. The scuffle is a very simple instrument, being nothing more than an iron blade fixed between two prongs; the handle of which may also be made of iron.

While the blade cuts the weeds off, under the surface, they fall between the prongs into their place again; and die without leaving the earth too much exposed to the sun.... This instrument fixed to a long handle is common in gardens, but when fixed in a beam is certainly much improved with respect to the diminution of labour. A man and a boy will accomplish more work in half a day, with the above hoe and scuffle, than could be performed by two men at the same work in one day, with common hoes, and from the experience of their utility, the Editor cannot too warmly recommend them to all who possess gardens.]

HOEING, or Horse-hoeing, in the dill-husbandry, is the breaking or dividing of the soil by tillage, while the corn, or other plants, are growing; it differs from the common mode of cultivation, which is always performed before the grain, &c. is sown, and is far more beneficial to the crop than any other method.

Horse-hoeing is practicable only on lands that are easily ploughed; and it is from inattention to this circumstance, that it has not been attended with success, and has, in many parts of England, fallen into contempt.

Having already, described Dr. Darwin's ingenious drill-plough and horse-hoe, and given ample directions for their use, we shall, in this place, mention only such implements as have not been specified in the article Drilling, and which merit particular notice.

A horse-hoe on a new plan was contrived a few years since by the ingenious Mr. Ducket, whose inventions we have had frequent occasion to mention. It is made wholly of iron (including the carriage); and consists of two common plough-shares, which work from twenty to twenty-four inches of ground in breadth, accordingly as they are *winged*. These are fixed by means of wedges into a twisted beam, and the whole is put together with such strength, that they may be worked with four horses, at any depth required. Mr. Ducket applies his hoe to various purposes, but chiefly to the eradicating of pea, bean, and other stubbles, in order to prepare them for the plough; and so effectually does

the implement answer, that the corn may be sown, even though the soil should not have been previously ploughed.

In the 2d vol. of Dr. ANDERSON's *Recreations in Agriculture*, we meet with an account of an improved method of horse-hoeing; which is stated to be performed in the most perfect manner, merely by the aid of a *double-mould-board-plough*. It is particularly calculated for the clearing of weeds, &c. from cabbages, round which the earth is heaped, so as to make those plants thrive with uncommon luxuriance. For a minute account of this operation, the reader will consult the work before quoted; where its superiority over Mr. TULL's horse-hoeing system is pointed out, and the subject illustrated with cuts.

The best season for hoeing good land, is, two or three days after rain has fallen, or as soon after as the soil will not adhere to the hoe, when at work. Light, dry lands, indeed, may be dressed at almost any time; but the season for hoeing strong clay-soils, is very frequently short and precarious. Hence it will be useful to point out the proper juncture. There is a period between the time of the clay-soils running together so as to form puddles, in consequence of superfluous moisture, and that of their consolidating into hard cakes from great drought; when they are sufficiently tractable. This is the proper season; and whatever land is then hoed, will not cake together, till it has been again penetrated by rain; in which case the operation is to be repeated at the time just mentioned, and as often as is necessary, till the growing crop begins to cover the soil; when it will in a manner screen the surface of the land against the intense heat of the sun; and consequently in a great measure prevent the inconveniencies attendant on the consolidation of the soil, during dry weather.

By the successive hoeing, the land will be brought into a high state of improvement; and, if the weather prove favourable, good crops will be obtained, while, by a contrary practice, the soil is rendered useless; and, from the stagnation of the water, become a public nuisance.

HOG, or *Sus*, L. a genus of animals consisting of six species, the most remarkable of which is the *scrofa*, or Common Hog. Its body is covered with bristles, and it has two large teeth, both in the upper and lower jaw. In a wild state, this creature is of a dark brinded colour, and beneath the bristles is a short soft hair; its ears are more diminutive than those of tame hogs, which are long, sharp-pointed, and hang down; the colour of the latter is generally white, though sometimes mixed with other shades.

The hog is proverbially the most rude and brutal of quadrupeds; its habits are gross, and such is its gluttony, that it devours every thing indiscriminately. But, though it be the most impure and filthy of animals, its sordidness is useful, inasmuch as it swallows with avidity, refuse and offal of every kind so that matters which would become a nuisance, are converted into the richest nutriment.

Sows generally breed at the age of 18 months, or two years, and bring from 5 to 10 or more pigs, twice [or oftener] in the year after a gestation of four months.

As hogs, from their voracious

nature, will eat almost every thing, they are very generally reared in all situations, being quickly and cheaply fattened. In miry and marshy ground, where they delight to wallow, they devour frogs, fern, the roots of rushes, sedge, &c. In the drier countries, they feed on hips, haws, sloes, crabs, beech-mast, chesnuts, acorns, &c. on the last of which they thrive exceedingly. Of late years, however, the management of these animals has become an object of attention. Clover, potatoes, turnips, cabbages, and carrots, are, it is well known, articles with which they may be fed, and even fattened, at a small expense. Parsnips are of considerable utility for this purpose, and probably the roots of the white-beet, if it were fully tried, would be found still more useful; for experiments have shewn, that it contains a considerable proportion of saccharine matter, and may be cultivated with very little difficulty. Cos-lettuces are likewise eminently serviceable, especially for young pigs, which when fed on them, may be weaned a fortnight earlier than is usual. Pease also afford an excellent food for fattening, and if duly mixed with salt, will render the animal fit for sale at the end of five weeks.

In the vicinity of London, vast numbers of hogs are annually fattened with grains from the distilleries: such pork, however, does not take the salt so readily as the flesh of those pigs which have been fed with more substantial food, and been driven to the market from a considerable distance.

Hogs may with great advantage be folded on wheat, where the soil is loose, light, and friable; for they will drop a considerable quantity of dung, and tread the looser parts of the land so closely together, that it will not *hove* during summer; nor will the wheat be *root-fallen*. Particular care, however, ought to be taken, that these animals be *well ringed*; an operation that ought to be performed as early as possible.

The diseases to which hogs are subject, are but few; nor are they often troubled with them. The chief are, 1. The *measles*, said to be perceptible only in the throat, which, on opening the mouth, appears full of small tumors, that in some cases are visible externally. The remedy usually applied is the powder of crude antimony, in small portions, which generally removes the affection. 2. The *fever*, which is also called the *heaving of the lights*: it is cured by giving the diseased animal a mixture of oil and brimstone; 3. the *Mange*; 4. the *Murrain*, or *Leprosy*; and, 5. the *Gargut*; to which articles we refer the reader, in their respective order.

Hogs are very valuable quadrupeds, and their flesh furnishes at all times an agreeable meat. (See Bacon and Ham.) In a fresh state it is called *pork*, and affords a wholesome and nourishing food to a sound stomach, when eaten in moderation, with sub-acid vegetables or sauces. Their lard, or fat, is applicable to various purposes, both culinary and medicinal. The blood, intestines, feet, and tongue, are all used in the kitchen; though the first is indigestible. The fat of the bowels and web, which differs from common lard, is preferably employed for greasing the axles of wheels. The bristles are made

into brushes, pencils, &c.; the skins into sieves; yet the latter might be more advantageously tanned, and converted into shoes, as is the practise in China, where all the shoes sold to the Europeans at Canton, are made of hog's-leather, the hair being previously burnt off with a red-hot iron.

The dung of swine is reputed to be next in value to that of sheep, and is particularly useful in destroying that pernicious weed, the Common coltsfoot....See COLTSFOOT and DUNG.

As hogs are animals of extensive utility, we trust it will not be uninteresting to point out those remarkable breeds which amply repay the expense of fattening them.

1. The *Berkshire* hog is spotted red and brown, attains a large size, has small ears, short legs, and very broad sides. They are highly valued; but, as they grow uncommonly large, no person should attempt to keep them, unless he be provided with a sufficient stock of food; as otherwise they will dwindle away, become diseased, and yield less profit than a smaller kind.

2. The *Shropshire* swine grow to a large size: they are generally white, have short legs, and long ears, which hang down upon their cheeks. This is a fine breed, much prized at Barnet-market, and bears a close resemblance to

3. The *Northampton* hogs, which are white, have very short legs, and attain an extraordinary size, especially those reared at Naseby. They are chiefly distinguished by their ears, which are of of an enormous size, much larger than those of the preceding breed, and sweep along the ground, so as almost to blind them.

4. The CHINESE breed (which is one of the most profitable kinds of hogs introduced into this country) is very hardy; will live on less food than any of the animals already mentioned; and seldom appears lean. They are mostly white, attain to a large size, and will *fatten well* on food that would *barely keep* other hogs. To these may be added the *Suffolk* breed, which, in the estimation of some persons, is the best in England; and the *Leicester*, which is much fatter than that of Suffolk, but is said to produce *very few* pigs.

5. The *Large Spotted Woburn Breed*, introduced by the late Duke of BEDFORD; ....from the experience of the Earl of EGREMONT, and other able breeders, it clearly appears, that these animals are superior to the Suffolk breed; the former being not only more hardy, but also more prolific, and attaining double the size, in the same period of time.

6. The *Rudgewick Hogs*, are thus denominated from a village on the borders of Surrey and Sussex: this race of animals is remarkable for the astonishing weight they attain, in the course of two years, which exceeds that of other swine at a similar age, in the proportion of at least two, and often three, to one. Hence, they deserve to be more generally reared, and their number ought to be increased, because they repay the expense of their keeping more speedily than any other breed.

As many frauds are practised at markets and fairs, on the unsuspecting farmer or cottager, in the act of buying or selling hogs, we shall briefly communicate a few hints, that may furnish some rules for guarding against imposition.

In purchasing *lean* hogs, the most certain method is to judge by weight. If, therefore, a farmer were to weigh a few lean pigs which were about the size of those he intends to purchase, he would obtain some standard on which to proceed, and will consequently be able to bid a fair price in the market.

With respect to *fat* hogs, it has been proved from repeated experiments, that every 20 lbs. live weight will yield, when killed, from 12 to 14 nett weight. In those which do not exceed 12 stone (14 lbs. to the stone,) the weight will be 12 lb.; but, in larger animals, it will in general amount to about 14 lb. If, therefore, a farmer weigh them alive, he will not only know the clear profitable weight when killed, and consequently its value, but he will also, by weighing the animal every week, be able to ascertain the proper time to slaughter, or dispose of it to the best advantage; for, when the hog ceases to acquire that daily increase which renders it profitable, the best course that can be followed is, to kill him immediately.

[Mr. Billingsley prefers large hogs to small, for profit: and observes, that small growing pigs ate nearly as much food as the large full grown hogs, and yet they did not appear proportionably to improve either in size or fat; that advantage was derived from mixing up a quantity of meal a week or two before it was used; that no kind pay more for food than spayed sows; they fatten quicker and on less food. *Bath Soc. Transaction*.

In April, 1769, a hog was killed at Williamsburg, Virginia, which weighed 1050 lbs. after the blood, bowels, and hair had been taken from him. It is supposed he weighed upwards of 1200lbs. when alive.

In March 1787, another hog was killed at New-Port, Rhode-Island, which weighed, when gutted and dressed, 834 lbs. The length of the animal is said to have been nine feet, and height six feet.

The owners of these hogs were guilty of a very unpatriotic act, in sacrificing animals which would have been so highly valuable for breed. In future, it is to be hoped, a similar error will not be committed.

"A sow kept at Hollowmire, near Ulverston, only four years old last September, has farrowed 229 pigs, which is on an average of 57 per year, and except at the first time, always brought up thirteen. Within 19 weeks and three days she has farrowed twice. The animal went to the male the next day after the pigs were taken away, which was done when they were three weeks old...*Lon. Mont. Mag. January* 1798."

Under the article Clover, it was said, hopes were entertained of being able to give the particulars of an experiment in feeding a number of hogs upon a small clover patch, but the Editor has not been able to succeed, notwithstanding his exertions for the purpose.... Though it would have been agreeable to state the precise number, yet the utility of the practice of feeding hogs with cut clover, is well known to many farmers, and cannot be too strongly recommended to those who have not yet adopted it.

Parsnips are said to be highly fattening for hogs, and to give a fine flavour to the meat. This vegetable abounds with sugar, and therefore must be nourishing;

but it is probable that Indian corn (mayz) would be required to harden the flesh before killing.

Under the article CATTLE, the economy of feeding with boiled food was mentioned with confidence, though no direct experiment was adduced to support the opinion.... The following comparative experiment, however, settles the point. Mr. TIMOTHY KIRK of York-Town, Penn. fed one pig with boiled potatoes and Indian corn, (mayz) and another with the same articles unboiled. The two animals were weighed every week, and the difference between them was as 6 to 9. The experiment was continued several weeks, and the animals alternately fed upon boiled and unboiled food, with an uniformity of result, which sufficiently proved the very great profit arising from boiled food.

Mr. KIRK's very excellent and economical boiler shall be described under the article WATER. There are few domestic conveniences that exceed this in point of utility.]

HOG'S FENNEL. See Common or Sea SULPHUR-WORT.

HOGSHEAD, in Commerce, a measure of capacity which contains 63 gallons.

HOG-WEED. See COW-PARSNIP.

HOLLY, or *Ilex*, L. a genus of shrubs consisting of 16 species; one of which is a native of Britain, namely, the *aquifolium*, or Common Holly-tree: it grows in woods or hedges, and produces small whitish flowers in the month of May, which are succeeded by scarlet berries that are ripe in December.

This evergreen is propagated by seed; for which purpose the berries are to be put into the ground for one year, after which they should be taken up, and sown at Michaelmas: the young plants will appear in the succeeding year..... These are to be transplanted in the summer; and, if the operation be carefully performed, their growth will be rapid, especially if they be watered in dry seasons, and the soil about the roots to be frequently loosened. There is a great variety of this cultivated shrub, all of which are propagated by budding, or engrafting them on stocks of the common green holly.

This species is of great utility: the croppings of its leaves afford, in winter, a grateful food to sheep; and its berries support the feathered creation, during that inclement season. The holly makes an impenetrable fence, and is eminently calculated for the formation of hedges, as it admits of being cropped, and retains its verdure, and the beauty of its scarlet berries, without receiving any injury from the severest winters. The common *bird lime* (which see) is prepared from the bark, after it has been fermented, and cleared from the woody fibres. Its wood is much used in veneering, and is frequently stained black, to imitate ebony. It is likewise advantageously employed in the making of handles for knives, and cogs for the wheels of mills.

In medicine, the leaves of the holly have lately been employed with uncommon success in cases of the gout, agues, colics, &c. the bird lime obtained from the bark is said to be an excellent application to obstinate swellings.

HOLLYHOCK, or *Alcea rosea*, L. a beautiful exotic plant, frequently cultivated in our gardens. It is a native of China; grows to the

height of 8 or 9 feet; and nearly the whole of its stalk is covered with white, red, brown, yellow, or variegated flowers that continue to blow till September.

The hollyhock is propagated either by seeds, deposited in drills, about the middle of April, on beds of light earth, and afterwards covered with soil about half an inch deep; or, by separating and setting the roots. As soon as the plants shoot forth a few leaves, they are removed into nursery beds, where they require to be well watered till they have taken root; after which no farther care will be necessary till the month of October, when they should be transplanted to those places where they are intended to remain.

Beside the ornamental appearance of this majestic plant, Dr. Bohmer informs us that the soft, fibrous, and woody parts of its stalks, without any addition of rags, produce a white and fine paper.

Honesta. See Traveller's Joy.

Honewort, the Hedge. See Bastard Stone Parsley.

HONEY, a sweet fragrant vegetable juice, collected by the bees from the flowers of various plants, and deposited in the cells of the comb.

Having already treated of the best methods of taking the honey from hives we shall in this place only observe, that the honey produced by young bees, and which flows spontaneously, is purer than that expressed from the comb; whence it is called *virgin honey*: the best sort is of a thick consistence, and of a whitish colour inclining to yellow; it possesses an agreeable smell and a pleasant taste.

As an article of food, when immoderately used, honey is pernicious to weak stomachs; it ought, therefore, to be avoided by persons liable to eruptions of the skin, or in whom there is a redundancy of bile. This vegetable essence contains an acid, similar to that of sugar, but is more spirituous: hence it readily ferments, occasions flatulency, and in some habits produces gripes and looseness.

As a medicine, however, it is a very useful aperient and expectorant, especially when it has been previously boiled; in which state it may be used with safety and advantage by asthmatic patients; for it tends to dissolve viscid humours, and to promote the expectoration of tough phlegm...See also *Chapped* Hands.

Notwithstanding these salubrious properties of honey, it is apt to produce effects very detrimental to those plethoric, bilious, febrile or *cachectic* patients, who trust to it as a remedy in coughs, arising from, or connected with, pulmonary complaints. The writer of this article has lately seen two mournful instances of young females, each of whom, by a singular infatuation, had swallowed such quantities of a quack medicine, called "the balsam of honey," as amounted to the sum of *ten guineas*, in order to cure a catarrhal cough, and to prevent it from attacking the lungs. Unfortunately, however (and let it be recorded here as a warning to others,) they had proceeded too far in slighting an organic affection, which preyed on the functions of life; and both, in the course of six months, fell victims to a fatal delusion.

Honey is also convertible into an agreeable liquor, termed Mead, of

which the reader will find an account in its alphabetical order.

Although Prof. LOWITZ has satisfactorily proved that honey may, by a chemical process, be consolidated into sugar; yet, as such a change would not be profitable, where the former is sold at a much higher price than the latter, we shall suggest a more advantageous mode of employing this balsamic juice. If a pound of honey be dissolved in three or four quarts of water, and exposed to a temperature between the 70th and 80th degrees of FAHRENHEIT'S thermometer, it will in a short time become a very agreeable acid liquor, which possesses an aromatic flavour, and strength, superior to that of the best *vinegar* made of white wine. As the latter is frequently adulterated, and incomparably more expensive than the substitute we have proposed, this appears to deserve every attention in domestic economy.

HONEY-DEW, or *Suffusio mellita*, a sweet substance found on the leaves of oak, hazel-nut, hops, and other plants; and which has been erroneously supposed to fall from the sky.

According to Dr. DARWIN, the honey-dew is a saccharine juice that exudes from trees, in consequence of the retrogade motions of the cutaneous lymphatic vessels connected with the umbilical, or with the common sap-vessels of plants; instead of being carried forward to increase the growth of the present leaf buds, or to accumulate nutriment for the buds, which are in an embryon state.

This exudation is consequently very injurious to the trees which are subject to it; especially from its great sweetness, which attracts immense numbers of bees and ants.

Mr. FORSYTH directs those trees, which are most liable to such distemper, to be sprinkled with a mixture of limewater and urine; after which they should be washed with the liquid, stated in the article BLIGHT. These remedies, however, ought to be applied early in the morning; in order that the trees may become dry, before the solar rays produce intense heat; as, otherwise, the blossoms and leaves are apt to be scorched, and thus to be materially injured.

HONEY-SUCKLE, or *Lonicera*, L. a genus of plants consisting of 20 species, two of which are natives of Britain, viz.

1. The *Periclymenum*, Common or Woodbine Honey-suckle, which grows in hedges and woods, and flowers from June to August. It is eaten by cows, goats, and sheep, but refused by horses. The beauty and fragrance of its variegated flowers, renders this species a pleasing ornament of our gardens, hedges, and arbours. The best, as well as the easiest method of propagating it, is by layers and cuttings, both of which readily strike root, and form plants that are fit to be set out in one year. The ripe berries are strongly purgative.

2. The *Xylosteum*, or Upright Honey-suckle, which grows on walls and in hedges; it flowers in May. According to LINNÆUS, this shrub forms excellent garden hedges in a dry soil, especially where flocks of sheep are frequently passing, as these animals do not eat the leaves. Its wood is extremely hard, and makes the best ram-rods, as well as pegs, or pins for musical instruments, teeth for

rakes, and similiar articles. The small reddish and juicy berries excite vomiting, and are so powerfully laxative, that they are not touched even by birds.

Honey-suckle, the Darf...... See Dwarf Cornel.

HOOF, the horny part which covers the feet of many valuable quadrupeds; but, in this place, we shall treat of it only so far as it relates to that useful animal the *horse*.

A *perfect hoof* should be round, smooth, tough, and short, so that the horse may tread more upon the toe than upon the heel: it should also be rough and somewhat hollow within, having a narrow frush and broad heels. On the contrary, imperfect hoofs are rather broad than round; and, if spreading out of the sides and quarters, the heels of such a horse are generally narrow, and will sooner or later become *flat-hoofed*, have a weak foot, and not carry a shoe long, nor travel far without surbating: thus, by treading more upon his heels than upon his toes, he will walk low on his pasterns, and his feet, through weakness, will become subject to what are called false quarters, gravelling (which see,) and other maladies, of which we have subjoined a short account.

HOOF-BONEY, a distemper arising from external injury, either a stripe, blow, or by a horse bruising himself in his stall, by attempting to strike at the next animal, but missing his aim, and dashing the foot against the post or rail that separates them. It consists of a round horney swelling on the uppermost part of a horse's hoof.

To bring this hard tumor to maturity, it may be covered either with a poultice of hay boiled in stale urine, or with a plaster of wine-lees and wheat-flour simmered together over a fire. By such applications, it is generally dispersed; but, if it should come to a state of suppuration, it must be lanced in the soft, lower part, to give vent to the matter; and then covered with a plaster made of the following ointment: Take equal parts of turpentine, suet, and wax, melt them together carefully over a slow fire. The use of this salve should be continued, till the ulcer is perfectly healed.

HOOF-BOUND, an unnatural contraction of a horse's hoof, on the top and at the heel, so that the skin appears to grow over the hoof. It is easily discovered by the frequent halting of the horse, and the hollow sound of the diseased hoof: it arises from various causes, such as keeping him too dry in the stable; an injudicious method of shoeing; paring the soles as often as the animal is shod, &c.

As this malady always approaches gradually, it may be relieved at the commencement of every stage, or species of it, by proper management; but, if it become inveterate, no art whatever can effectually remove it.

The first species proceeds, in general, from the injudicious use of concave shoes, or from paring and hollowing out the sole and binders as often as the shoes are renewed. Hence, the heels become so thin, that the crust at the extremity may be forced into contact by the slightest pressure: the contraction of the hoof at length becomes general, and incurable. The only remedy in this case is, to keep the hoofs cool and moist, never to suffer them to be greased, or the soles to be pared, and to use only flat, narrow, and open heeled shoes.

Thus the stricture on the heels and frog will be in some measure removed, the animal affected considerably relieved, and the disorder at length so far palliated, as to enable him to walk with more firmness.

Another species is a contraction of one, or frequently of both heels, in *flat* feet, from the use of concave shoes, &c. The best remedy in this case is, to lay aside such improper shoes; to pare or rasp to the quick the whole contracted quarter of the crust near the heel, but without drawing blood: a *barred* shoe is then to be put on, so as to make the bar of the shoe press upon the frog; the hoof should be kept moist, and the diseased animal turned out to grass. Thus the stricture of the hoof will gradually disappear, the contracted part expand, and a new hoof grow from the coronet downwards, that will acquire a round, proper shape, and in a short time the horse will be restored to his former activity.

HOOF-BRITTLE, or BRITTLEHOOF, a disorder in horses, which is either constitutional in the animal, or arises from a surfeit, and as farriers express it, falls down into his feet; or, is the consequence of the horse having formerly been *foundered* (which see.) To remove this malady, some prescribe the following ointment to be liberally applied to the hoofs two or three times a day: Melt equal quantities of turpentine, mutton-suet, raw bees-wax, hogs-lard, and salad-oil, in an earthen pot.

HOOF-CASTING, a misfortune that sometimes befals a horse, when the horny substance entirely separates from his foot, in consequence of his foundering or slipping, which breaks it on the top round the coronet, so that it at length drops off.

[The hoof must be defended with care, by wrapping it up in tow covered with bees-wax and oil, and any fungous flesh that may appear, taken down by burnt alum or blue vitriol, whilst the animal must be suffered to rest. Where the disease proceeds from improper hay, as mentioned in vol. 2d. p. 52. or from meadow grass not duly watered, (see p. 196); the remedy is obvious.]

HOOF-HURT, an injury incident to working cattle, especially to oxen, which are sometimes wounded by a coulter or share of a plough in any part of the *clees*.

[The remedies in this complaint are, a softening ointment and rest.]

HOOPING-COUGH. See CHIN-COUGH.

HOP, the COMMON, or *Humulus Lupulus*, L. an indigenous plant, growing in hedges, and flowering in June.

Hops delight in a good rich loam, with a deep sub-soil or stratum of a loamy brick-earth, in a southern or western exposure; though they grow in almost any ground that is not *wet*. They are chiefly cultivated in the southern counties of England, and are propagated either by nursery-plants or by cuttings. These are set in *hills*, formed by digging holes in the spring, which are filled with fine mould and the number of which varies from 800 to 1000, or 1200 per acre. One, two, or three plants are put in each hill, but, if hops are designed to be raised from cuttings, four or five of these, from three to four inches in length, are planted and covered one inch deep with fine mould.

At the end of the first year it becomes necessary to put poles into

the hills, round which the bines reared from plants are wound: at the expiration of the second year, full-sized poles from 15 to 20 feet are set (though the hop-bines will run to the height of 50 feet,) in the proportion of two poles to each hill, and a similar number of hop plants are fastened loosely round each pole, by means of withered rushes.

Hops begin to blow towards the middle of June, and about the end of August they are generally fit to be gathered. The most proper time of collecting them is, when the leaf rubs easily off the bine, when the hops have a strong scent, and the seed assumes a brownish colour.

The culture of hops, though profitable when it succeeds, is very precarious: as soon as the plant appears above ground, it is attacked by an insect somewhat similar to the turnip-fly, which devours the young heads. Hop-gardens, situated on chalky soils, are peculiarly subject to its depredations; and the best remedy is to manure the soil highly with *malt-culm*, which adheres so strongly to the insects, as to prevent them from creeping over the plant.

[The hop is an article of growing importance in the United States, and should be cultivated by every farmer more or less, as they require little trouble and pay well. Farnham hops are the best.

The following directions for raising and curing hops, are taken from the *Trans. Agric. Soc. of New-York.*

A rich deep soil, rather inclining to moisture, is, on the whole, the best adapted for the cultivation of hops; but it is observable, that any soil, (stiff clay only excepted) will suit the growing of hops when properly prepared.....and in many parts of Great-Britain they use the bog-ground, which is fit for little else. The ground on which hops are to be planted, should be made rich with that kind of manure best suited to the soil, and rendered fine and mellow by being ploughed deep and harrowed several times. The hills should be at the distance of six or eight feet from each other, according to the richness of the ground. On ground that is rich, the vines will run the most; the hills must therefore be farthest apart.

At the first opening of the spring, when the frosts are over, and vegetation begins; sets, or small pieces of the roots of hops, must be obtained from hops that are esteemed the best*....cut off from the main stalk or root, six or eight inches in length. Branches, or suckers, most healthy, and of the last year's growth, must be sought for. They may easily be known by their looking white. .....Two or three joints or buds should be left on each set. The sets should be put into the ground as soon as taken up, if possible; if not, they should be wrapped in a cloth, kept in a moist place excluded from the air. A hole should then be made large and deep, and filled with rich mellow earth. The sprouts should be set in this earth, with the bud upwards, and the ground pressed close around them. If the buds have begun to open,

* Of the different kinds of hops, the long white is most esteemed. It yields the greatest quantity, and is most beautiful. The beauty of hops consists in their being of a pale bright green colour. Care must be taken to obtain all of one sort, but if different sorts are used, they must be kept separate in the field; for there is in different kinds of hops a material difference in their time of ripening; and if intermixed, will occasion extra trouble in gathering.

the uppermost must be left just out of the ground; otherwise, cover it with the earth an inch. Two or three sets to a pole will be sufficient, and three poles to a hill will be found most productive. Place one of the poles towards the north, the other two at equal distances about two feet a part. The sets are to be placed in the same manner as the poles, that they may the easier climb. The length of the poles may be from fourteen to eighteen feet, according as the soil is for richness. The poles should be placed inclining towards each other so as to meet at the top, where they may be tied. This is contrary to the European method, but will be found best in America. In this way they will strengthen and support each other, and form so great a defence against the violent gusts of wind, to which our climate is frequently subjected in the months of July and August, as to prevent their being blown down. They will likewise form a three sided-pyramid, which will have the greatest possible advantage from the sun. It is suggested by experience, that hops which grow near the ground are the best. Too long poles are not good, and care must be taken that the vines do not run beyond the poles: twisting off their tops will prevent it. The best kinds of wood for poles are the alder, ash, birch, elm, chesnut and cedar. Their durableness is directly the reverse of the order in which they stand, and burning the end put into the ground, will be of service to preserve them. Hops should not be poled till the spring of the second year, and then not till they have been dressed. All that is necessary for the first year, is to keep the hops free from weeds, and the ground light and mellow, by hoeing often, and ploughing if the yard is large enough to require it. The vines when run to the length of four or five feet, should be twisted together to prevent their bearing the first year, for that would injure them. In the months of March or April of the second year, the hills must be opened, and all the sprouts, or suckers, cut off within an inch of the old root, but that must be left entire with the roots that run down; * then cover the hills with fine earth and manure. The hops must be kept free from weeds, and the ground mellow, by hoeing often through the season, and hills of earth gradually raised around the vines during the summer. The vines must be assisted in running on the poles with woollen yarn, suffering them to run with the sun.

By the last of August or first of September, the hops will ripen and be fit to gather. This may easily be known by their colour changing, and having a fragrant smell: their seed grows brown and hard.† As soon as ripe, they must be gathered without delay, for a storm,

* Hops must be dressed every year as soon as the frost will permit. On this being well done, depends in a great measure the success of the crop. It is thought by many to be the best method to manure the hop yard in the fall, and cover the hills entirely with manure; asserting, with other advantages, that this prevents the frosts during the winter, from injuring the hop. The truth of this may be determined by experiments in our climate and country.

† Hops had better be gathered before they are quite ripe, than remain till they are over ripe; for then they will lose their seed by the wind, or on being handled. The seed is the strongest part of the hop, and they will lose their green colour which is very valuable.

or frosts, will injure them materially. The most expedient method of picking hops, is to cut the vines three feet from the ground, pull up the poles and lay them on crotches horizontally, at a height that may be conveniently reached. Put under them a bin of equal length, and four may stand on each side to pick at a time. Fair weather must be taken to gather hops in, if possible; and hops ought not to be gathered when the dew is on them, for dew is apt to make them mould. They should be dried as soon as possible after they are gathered; if not immediately, they must be spread on a floor to prevent their changing colour. The best mode of drying them is with a fire of charcoal, on a kiln covered with hair-cloth, in the manner of a malt-kiln*. The fire must be kept steady and equal, and the hops stirred gently. Great attention is necessary in this part of the business, that the hops be uniformly and sufficiently dried: if too much dried they will look brown, as if they were burnt; and if too little dried they will loose their colour and flavour. They should be laid on the hair-cloth about six inches thick, after it had been moderately warmed; then a steady fire kept up till the hopes are nearly dry, lest the moisture or sweat, that the fire has raised, should fall back and change their colour. After the hops have been in this situation about seven, eight or nine hours, and have got through sweating; and when struck with a stick, will leap up, then throw them into a heap; mix them well and spread them again, and let them remain till they are all equally dry. While they are in the sweat, it will be best not to move them, for fear of burning them. Slacken the fire when the hops are to be turned, and increase it afterwards. Hops are fully dried when their inner stalks break short, and their leaves are crisp and fall off easily. They will crackle a little when their seeds are bursting; and then they must be taken from the kiln. Hops that are dried in the sun, loose their rich flavour, and if under cover, they are apt to ferment and change with the weather, and loose their strength. Fire preserves the colour and flavour of hops, by evaporating the water, and retaining the oil of the hop. After the hops are taken from the kiln, they should be laid in a heap to acquire a little moisture to fit them for bagging. It would be well to exclude them from the air, by covering them with blankets. Three or four days will be sufficient for them to lie in that state.... When the hops are so moist that they may be pressed together without breaking, they are fit for bagging. Bags made of coarse linen cloth, eleven feet in length, and seven in circumference, which hold two hundred pounds weight, are most commonly used in Europe: but any size that best suits may be made use of. To bag hops, a hole is made through a floor large enough for a man to pass with ease; the bag must be fastened to a hoop larger than the hole, that the floor may serve to support the bag, and for the convenience of handling the bags, some hoops should be tied in each corner to serve as handles. The hops should be gradually thrown into the bag, and trod down continually till the bag is filled.... The mouth of the bag must then

* Mats made of the splinters of walnut or ash, will answer the purpose, and come cheaper than hair-cloth.

be sewed up, and the hops are fit for market. The harder hops are packed, the longer and better they will keep; but they must be kept dry. In most parts of Great Britain where hops are cultivated, they estimate the charges of cultivating an acre of hops at forty-two dollars, for manuring and tilling, exclusive of poles and rent of land. Poles they estimate at sixteen dollars per year, but in this country they would not amount to half that sum. An acre is computed to require about three thousand poles, which will last from six to twelve years, according to the kind of wood used.

The English growers of hops think they have a very indifferent crop, if the produce of an acre does not sell for one hundred and thirty three dollars, and frequently they sell for two hundred dollars; and have been known to rise as high as four hundred dollars. In this country experiments have been equally flattering. A gentleman in Massachusetts, in the summer of 1791, raised hops from one acre of ground that sold for three hundred dollars; and land is equally good for hops in this state. Upon the lowest estimate we may fairly compute the nett profit of an acre of hops to be eighty dollars, over and above poles, manure and cultivation.

There is one circumstance farther we think has weight. and ought to be mentioned. In the English estimate, the expense put down, is, what they can hire the labour done for, by those who make it their business to perform the different parts of the cultivation. A great saving may therefore be made by our farmers in the article of labour; for much of it may be performed by women, children, and the aged. Add to this, we have another advantage of no small moment. In this country the hop harvests will come between our two great harvests, the English and Indian, and interfere with neither: but, in England, the grain and hop harvests interfere, and create a great scarcity of hands, it then being the most busy time in the year. It is found by experience, that the soil and climate of the eastern states are more favourable to the growth of hops than Great Britain; they not being so subject to moist foggy weather of long continuance; which is most injurious to hops. And the southern states are still more favourable to the hop than the eastern states, in point of flavour and strength. The state of New-York unites some advantages from either extreme of the union. The cultivators of land in this state have every inducement which policy or interest can afford, to enter with spirit into the cultivation of hops. We shall, therefore, be enabled to supply our own demand, and export this article, instead of sending abroad for all we use; and no crop that can possibly be put on land, will yield an equal profit.... This culture will require but little land...the labour may be performed at intervals, so as not to interfere or injure the other business of the farm, by the aged, women, and children.

There is no farmer of this state but may, with ease, raise from one quarter of an acre, to as much as three or four acres of hops, the advantage of which would in a few years, be most sensibly felt, both by the individual concerned, and by the state at large.]

In the months of June and July,

[in England] the hops are liable to be *blown* by a species of *aphis*, or fly, that poisons the leaf, by voiding its excrement; which is particularly injurious during hot, cloudy, and moist weather. This insect, however, does not endanger the growth of the plant, unless it be in a weak state, in consequence of the depredations committed on its root by the larvae of the ottermoth, or *Phalœna Humuli*, L. For the expulsion of these vermin, Dr. WITHERING recommends to cover hop-gardens with stones or flags; because, when hops grow wild in stony places, where the moth cannot penetrate to deposit its eggs, they are never affected with the honey-dew.

There are two other distempers incident to hops, namely, the *Fen* and the *Smitt*, for which no effectual remedy has hitherto been discovered. Hops may, however, when gathered, be perfectly secured from the future depredations of insects, by putting a small quantity of brimstone in the fire, while they are drying in the kiln, by which means the vermin is not only destroyed, but the superfluous moisture is more speedily evaporated, and the hops acquire a brighter colour.

The hop is a most valuable plant: in its wild state it is relished by cows, horses, goats, sheep, and swine. When cultivated, its young tops are eaten, early in the spring, as substitutes for asparagus, being wholesome and aperient; they are sold under the name of *Hop-tops*.

The principal use of hops, however, is in brewing, for the preservation of malt liquors, which are thus rendered more salubrious, and less liable to become sour..... Hence vast quantities are consumed in Britain: but, having already pointed out the most proper methods of using them under the head of BREWING, we refer the reader to that article.

A decoction of hops diluted with water, and given to cattle in very severe weather, is said to be of great service, and remarkably to improve their strength. In Sweden, the stalks of hops are successfully converted into strong cloth; for which purpose they are gathered in autumn, soaked in water during the winter, and in the succeeding spring, after being dried in stoves, they are dressed like flax. This object has been attempted in Britain, and from an experiment made, in consequence of the premium offered by the patriotic *Society for the Encouragement of Arts*, &c. it appears that hop-bines afford a material for spinning yarn, which may be woven into fine sacking, as well as coarse bags for hops. The bines are also employed for binding the sheaves of corn; and they have lately been converted into strong paper. From the leaves and flowery stalks of this plant, when dried, DAMBOURNEY dyed wool of a fine cinnamon brown, having previously dipped it in a diluted solution of bismuth. BERTHOLLET remarks, that the expressed juice of hop-bines affords a very permanent red-brown colour.

In medicine, decoctions and syrups of hop-flowers are said to be attended with much benefit in pestilential fevers: a pillow filled with them, and laid beneath the head, has been found to procure sleep to patients afflicted with delirious fevers. The heads and tendrils are

likewise of considerable service in the scurvy, and other cutaneous affections.

Hop-trefoil: See Clover, the Hop; p. 152 of vol. II.

HOREHOUND, the White, or *Marrubium*, L. a genus of plants comprising 12 species, one of which only is indigenous, viz. the *vulgare*, or Common White Horehound, which grows on road sides, and among rubbish; it flowers from July to September.

This very bitter plant possesses an odour sufficiently grateful; when given in large doses, it operates as a purgative. It is reputed to be both attenuant and resolvent; an infusion of the leaves in water, sweetened with honey, is recommended in asthmatic and phthisical complaints, as well as in most other diseases of the breast and lungs.... We believe, however, it may with equal, or greater advantage, be employed in currying or tanning soft leather.

Bees collect honey from the flowers of the Common White Horehound, but the herb is not eaten by either horses, cows, sheep, or goats.

HOREHOUND, the Black, Fetid Horehound, or Hen-Bit, *Ballota nigra*, L. an indigenous perennial plant, growing on rubbish and in hedges; flowering in the months of July and August.... No species of cattle will touch this vegetable, which is, nevertheless, highly prized by the Swedes, who consider it as an almost universal remedy in the diseases of cattle.

A strong decoction of the Fetid Horehound has been much recommended in hysterical and hypochondriacal cases. An infusion, or tea, made of equal parts of this plant, of betony leaves, and white horehound, is asserted by Ray, both to prevent the gout, and mitigate the attacks of that painful disorder, if three or four tea-cupfuls of it be regularly drunk every day.

HOREHOUND, the Water, or Gypsywort, *Lycopus Europaeus*, L. an indigenous perennial plant, which grows on sandy ground, on the banks of streams and ponds; it flowers from July to September.

The French manufacturers are chiefly indebted to this plant for the deep black colour of their cloth; its juice imparts a permanent dye to wool, silk and linen, and is much used by travelling gypsies, for the purpose of staining their faces.

HORN, a hard substance growing on the heads of various animals, particularly on cloven-footed quadrupeds. The oil extracted from it, by repeated distillations, becomes extremely subtle and volatile; in which state it is called *oil of* Dippel, being the name of its inventor.

The horns of stags yield the greatest proportion of rectified animal oil, as they contain a larger quantity of that species of earth which is found in bones, than those of any other animals.

Horns form a considerable article in the arts and manufactures...... Those of bullocks, when softened by heat, are converted into lanthorns, combs, knives, inkhorns, &c. After the horn is *roasted* over a fire made of the stalks of furze, so as to render it sufficiently soft, it is slit on one side, and spread out between a pair of flat tongs, large enough to keep it expanded a second time over the fire, and reduce it to a flat state; it is then put into a press between iron plates which are heated and greased. Here the

horns are suffered to remain till they are gradually cooled; next they are soaked in water, till soft enough to be pared down to a proper thinness, with a large knife worked horizontally on a block.....

Thus, they acquire their transparency; and, after being immersed in urine, they are polished, by rubbing them with whiting and the coal of burnt willow.

The refuse or shavings of horn are of considerable utility as a manure for chalky land, on which they are strewed in the proportion of fourteen bushels per acre. Their efficacy was not exhausted after a succession of four crops, each of which was remarkably improved. Hence they are advantageously employed on light and gravelly soils, together with hotter manures, preventing the latter from burning the crops; because horny substances have been observed to attract the dew, and retain moisture.

HORNBEAM, or *Carpinus*, L. a genus of plants consisting of five species one of which is a native of Britain; viz. the *Betulus*, Common Horn-beam-tree, Hard-beam-tree, Horse or Horn-beech-tree. It grows in woods and hedges; flowers in the month of May.

The horn-beam will thrive on poor, stiff soils, on barren and exposed hills; and, if intended for trees, it is propagated by seed, as soon as it is ripe. It vegetates eighteen months before the plants appear above ground; and the young trees are transplanted at the age of two years, to the spots where they are intended to remain. When designed for hedges and underwood, it is propagated by layers.

The horn-beam is a very valuable tree, and grows to a large size; its leaves afford a grateful food to cattle, but no grasses will flourish under its shade. Its wood is very tough, white, and burns like a candle; it is much employed by turners; is very useful for various implements of husbandry; and is wrought into cogs for the wheels of mills, presses, &c. which are far superior to those made of yew.... The inner bark imparts a permanent yellow colour to yarn.....See also Fence.

HORN-DISTEMPER, a disorder incident to horned cattle: it gradually wastes the internal substance of the horn, commonly called the *pith*, which is the spongy part of the bone, and the cells of which are filled with an oily matter. Thus, at length, the horn becomes hollow.

From an account published by Dr. Tofts, in the 1st vol. of the *Memoirs of the American Accademy*, it appears that this spongy bone is sometimes partially, and sometimes entirely, consumed. The horn is deprived of its natural heat, and on touching it feels unusually cold.... When this malady is suspected, other symptoms should be particularly attended to; such as dullness in the countenance; a sluggish motion; want of appetite; a desire to lie down; and, if attended with an inflammation of the brain, a giddiness, and frequent tossing of the head. Stiffness, as in the rheumatism, affects the limbs; the milk often fails in cows; the udder is hard, and there is in most cases a sudden wasting of the flesh.

As soon as the distemper is discovered, an opening should be made in the diseased horn, with a gimlet of a moderate size, two or three inches above the head. If it be found hollow, and the gimlet

pass through without any discharge of blood from the aperture, it will be advisable to bore lower, and as near to the head as the hollowness may probably extend. This aperture is asserted to be a necessary operation, and frequently affords speedy relief. It should, however, be carefully kept open, as it is liable to be filled up by a thin fluid that gradually oozes out, and obstructs the passage. Sawing off the horn has sometimes been adopted; but, from the best observations, boring is a preferable expedient. Dr. TOFTS supposes injections to be useless; as nothing more is required than to perforate the horn in an early stage of the distemper; and to keep it open, in order to admit fresh air, to prevent compression, and to promote the discharge of fluctuating matter. Should, however, the distemper have affected the brain, so as to produce a high degree of inflammation, no method of cure is likely to succeed; and the animal ought to be killed without farther delay; as otherwise its flesh would become useless.

HORNED POPPY. See POPPY, the Horned.

HORNET, or *Vespa Crabro*, L. a well known insect, which is about one inch in length, and builds its nest in hollow trees.

Hornets are very voracious, devouring other insects, and even bees. Their sting is severe and occasions a considerable tumor, accompanied with intense pain; for the mitigation of which, there is no better remedy than sweet oil, or honey-water, immediately applied to the injured part.

Different methods have been suggested for exterminating these pernicious insects; the most simple of which appear to be the following: Towards the end of April, hornets are found on rotten planks, gates, and posts, in a torpid state: each of these insects contains the generation of a swarm; and as they may then be easily taken, the destruction of one, before they breed, is equal to the extirpation of numbers. After they are hatched, hornets chiefly infest melon-beds, where they occasion great injury to the fruit. In order to prevent these depredations, it has been recommended to procure slender rods of different lengths, and to rub the ends of them with bird lime. By touching the insects with these rods, they may easily be taken; and, as the *females* only proceed in quest of food, by destroying these, the whole brood will consequently perish.

HORSE, or *Equus*, L. a genus of quadrupeds consisting of five species: the principal of these is the *caballus*, or common horse, which has a flowing mane, and the whole of its tail is covered with long hair.

There are, strictly speaking, no wild horses to be met with at present; and those which are suffered to roam at large in Tartary, Siberia, and America, are of a small size, inelegant form, and extremely intractable. In a domestic state, the horse is bold, intrepid, docile, and attached to the company of man; indeed no quadruped is so eminently qualified for both purposes, the saddle, and the harness... In the breeding of horses, however, sound and well-shaped animals ought to be selected with particular care; as the strength and excellence of the race entirely depend on this circumstance. For *elegance*, the Spanish and Italian breeds are preferable; but, for the

more useful porpose of *draught* those of Britain, Normandy, and Holstein, are the most esteemed.

The females, or mares, bring forth one colt, after a gestation of eleven months: none of the parent creatures should be under four years of age. Castration is commonly performed when the colt is twelve or eighteen months old; but the most general, and, we believe, the best practice is, to delay that operation till the animals attain the age of at least two years; for they will then retain a greater degree of strength and spirit. If properly kept, they live to the age of forty years; but mares do not breed after eighteen, and stallions are useless at the age of twenty, so that they are fit only for the harness.

The horse being an animal of extensive utility, the most proper and least extravagant manner of feeding and keeping him, becomes an object of considerable importance.... Hence, potatoes, carrots, furze, cabbages, &c. have been successfully tried as substitutes for oats, and the more expensive method of *corn feeding:* where, however, grain *is* used, the most economical way will be to *boil*, and give it in a cool state to the animals, together with the liquor; by which simple means *one half* may be saved. Carrots are particularly serviceable, as broken-winded horses, when fed on these roots, speedily recover.... A considerable reduction may also be made, by cutting the hay into a kind of chaff, and mixing with it straw, or the broken ears of corn, which arise in dressing grain; and also by *soiling* horses with lucern, tares, or clover, instead of turning them out to grass in the summer; for, if they be well littered, the dunghill will nearly repay the expense of their maintenance....See also the articles FURZE, and LINSEED.

The management of horses, after having performed the labour of the day, is a matter of equal moment with their feeding; and, as considerable expense has injudiciously been incurred, by erecting elegant stables, we propose the following practice to the consideration of the rural economist. It consists, simply, in forming a small yard provided with a shed that is open in the front, and furnished with racks, as well as a pump and cistern placed in one of the corners. A superstructure of this kind, if well littered, is in every respect preferable to a stable, and will preserve horses in better health, without requiring any other currying or dressing, than is usually given by farmers' servants. The utility and convenience of such a yard have been fully evinced by a patriotic nobleman, the Earl of DARLINGTON, who has followed this practice with great success for several years, and observed, that horses thus managed, not only are more healthy than in stables, but at the same time able to work well, even after the age of twenty years.

The *diseases of horses* are various; but as we treat of them in their alphabetical series, we shall here only offer a few hints to the proprietors of these useful animals, by which many disorders may be easily prevented.

In all fresh wounds, the principal objects of attention are, to keep them clean, and protect them from the air; but, if any swellings or local humours arise, or the skin be bruised without being broken, they will be effectually removed, by applying GOULARD's mixture, which

is prepared by adding two tea-spoonfuls of extract of lead, and one large spoonful of strong camphorated brandy, to a pint of water; the whole is to be well shaken together, and set apart for use.

[Lead water, prepared by adding one table spoonful of sugar of lead to a pint, or pint and a half of soft water, is a more certain remedy than the extract of lead.]

There are many diseases in which clysters are an excellent remedy; but they are frequently administered with so little skill, by means of the common clyster-pipes, that they are of no service. Hence it will be useful to procure a pipe made of pewter, the body of which should be larger and longer than a quart pot: at one end let a handle be fixed, and at the other a tube which lessens gradually, in the same manner as a common squirt. This will absorb a pint or quart of any preparation, and discharge it with proper force.

Numerous disorders, however, arise from excessive labour; and the injudicious application of ill-formed shoes. To remedy this serious evil, the attention of farriers has lately been directed towards the improvement of horse-shoes, and the invention of such as may prevent pain, and render this valuable animal *sure-footed*. We shall, therefore, take notice of the different patents that have been granted for this purpose, under the article Shoe.

We have already observed, that the English horses are eminently adapted to the different purposes of agriculture. The breeds of cart-horses, which deserve more particular attention, are the large black ones bred in the counties of York and Northampton, and the *sorels*, for which the sandy tract of land in the vicinity of Woodbridge, Suffolk, has long been celebrated. The former are chiefly used by those farmers who are in the habit of purchasing *two-year-old colts*, which they work lightly for two or three years, and then sell them for *coach-horses*. This practice merits severe reprehension; for independently of the great risk in keeping valuable horses during the most critical period of their age, such precaution is necessarily attended with additional expense. The *York* and *Northampton* breeds, however, are reputed to be much inferior to the Suffolk *punch sorels*, which are admitted to be the best cart-horses in England. These are of a bright sorel colour; have very low *fore-hands*, large bodies, somewhat similar to those of cows, short legs, and ill-shaped heads; yet, though their appearance be thus aukward, they exceed every other breed in draught. These animals are of all sizes; but the smaller ones, 14½ hands high (the price of which is from 40l. to 50l. per pair), will be of great service.

The long-contested question, whether oxen or horses are preferable for agricultural purposes, we shall not venture to decide; though it will be useful fairly to appreciate the advantages, as well as the disadvantages, which attend the maintenance of either.

Oxen will draw the plough on tough clay soil and hilly lands, while horses stand still; but, on even and light ground, the latter not only work faster than oxen, but are incomparably more active for carriage. It deserves, however, to be remarked, that oxen may be maintained at a very small expense. The price of *two* horses

is computed to be equivalent to that of *nine* oxen : the food of the latter, during summer, consists merely of *grass*, and in winter of *straw*, on which provender they may perform moderate labour ; and, when *worked hard*, they are allowed a little *hay*. On the contrary, the food of a horse generally is hay, oats, beans, &c. The number of cart-horses constantly employed in Great Britain, is calculated at 500,000.......300,000 of which are allowed, by the most competent judges, to be superfluous. These cousume daily, upon an average, during nine months in the year, one peck of corn each ; which amounts to *sixty-three* bushels each per annum ; that is, (allowing one quartern loaf per week to every person, and computing only 12 loaves to the bushel) as much corn as will support *seven* persons, so that 300,000 superfluous cart-horses, *moderately* fed, require for their support a quantity of corn sufficient to maintain 2,100,000 persons! which number, if the inhabitants of Great Britain amount to ten millions, is nearly one fourth part of the whole population.

To invalidate this statement, it has been objected, that though oxen *may* be maintained at a less expense than horses, yet the latter are far preferable, as they perform their work with much greater alacrity ; and that the extra ploughing which a pair of horses will accomplish in *one* week, will fully pay the balance of keeping. Such is the difference of opinions, in the communication of which we have strictly adhered to facts ; yet it ought in justice to be added, that an ox *improves* in value 2l. per annum, upon an average, from the time he is used and fed as an *ox* ; and, when fattened, affords good and wholesome meat ; while a horse progressively *declines* till he, literally, "is of no value." [This subject shall be renewed under the article oxen.]

In this place we are induced severely to censure the inhuman practice of *docking* and *nicking* their tails, for no other reason, than to *improve* the beauty of heir appearance, and to prevent them from "flinging the dirt ;" thus depriving them of a very useful part, which was certainly designed by Nature for defending them from flies and other insects, during the summer heats, if for no other ostensible reason. Besides, it is highly probable that the tail assists the animal even in his common exertions ; balances his body when trotting, and thus prevents him from stumbling ; for it has been observed, by those who are conversant with the manners and customs of the East, that the horses of Turkey and Persia seldom stumble ; a circumstance easily accounted for, as the absurd and brutal practice of *docking* is unknown in those countries.

Another operation, equally cruel and injudicious, is that of *cropping* the ears of horses, which may perhaps be justified, where an animal has large, wide lopping ears, destitute of all spring or motion, and which are in some degree a deformity. But to cut off a pair of fine ears from a horse's head, merely to gratify the ridiculous taste of grooms and jockies, is, if possible, still more absurd than to *dock* or *nick* his tail. It is, indeed, utterly indefensible : for the ears neither retard the animal's motion, nor "fling dirt."....We trust the day

is not far distant, when this senseless prejudice will lose its influence over those men of sense and understanding who are now facinated by it; and when the vitiated taste of horse-dealers will be treated with merited contempt.

Independently of the important services which the horse renders mankind by his labour, his dung affords an excellent manure.

The urine, or stale, of these animals, likewise furnishes an excellent fertilizing liquor, if preserved with the brine, suds, &c. of the house: some caution, however, is necessary, in applying it to the soil.

Horse urine is equally beneficial to all lands; but it should be previously diluted in a proper vessel, with half the quantity of *pond-water*, and in that state poured on the ground. Thus, the great heat of this manure, which, in particular seasons, is apt to burn some crops, may be easily corrected.

As the utility of horses exceeds that of all other domestic animals, we shall subjoin a few characteristic marks, by which their general qualities may be ascertained, and some of the numerous frauds committed by grooms, jockies, &c. opportunely prevented.

In old horses, the *eye-pits* are generally deep: this mark, however, is very uncertain, as it is also found on young animals descended from aged stallions. But the most certain criterion is that derived from the teeth, the number of which amounts to 40; namely, 24 grinders, or double teeth, 4 tushes, and 12 fore-teeth: these last are the surest guides for discovering the age of a horse. They appear about 12 days after the colt is foaled; are round, short, not very solid, and successively cast and replaced by others. When two years and a half old, the two middle fore-teeth in the upper jaw, and those in the lower jaw, are cast: in the course of another year, four others drop out, one on each side of the former. At the age of about $4\frac{1}{2}$ years, the horse loses four others, and always, next to those which have already fallen out and been replaced. These four foal-teeth are succeeded by four others but do not grow so quickly as the eight first, and which are called *corner-teeth*. They replace the four last foal-teeth, and are the chief marks by which the age of a horse may be ascertained: they are the third, both above and below, counting from the middle of the jaw, being hollow, and having a black mark in their cavity...... When the horse is four years and a half old, they are scarcely visible above the gum; and the cavity is very sensible: in the course of a year and a half, they begin to fill; and the mark continually diminishes and contracts, till the animal attains the age of seven or eight years, when the cavity is completely filled, and the black spots disappear. These teeth cease to afford any knowledge of a horse's age, after *eight* years, when it is ascertained by the *tushes*, which are the four teeth next to those last mentioned, and which, like the grinders, are not preceded by any other teeth. The two in the lower jaw usually begin to shoot at $3\frac{1}{2}$ years, those in the upper jaw at 4; and both continue very sharp pointed till the animal is 6 years of age. At 10 years, the teeth in the upper jaw appear blunted, worn out, and long; the gum contracting in proportion to the in-

creasing years ; and the more exposed the teeth are, the greater is the age of the horse. From 10 to 13 or 14, little can be perceived to determine the age ; but at that time of life, the upper teeth seem blunted, the gum contracts, and these useful bones are left bare.... In proportion, therefore, to the greater or less degree of these marks, the age of a horse may be determined ; and likewise, though not perhaps with equal accuracy, by the bars in the animal's mouth, which decrease as he advances in years. On this occasion, it will not be useless to point an odious practice, of which many ostlers and stable-keepers are guilty, especially towards the horses of strangers. When provisions are at an exorbitant price, those inhuman monsters have sometimes the cruelty to mix a few leaves of the bird-cherry among the hay, or to rub the fatigued animal's teeth with tallow, or soap : in either case, it will obstinately refuse food, and not eat, till the hay is changed, or the teeth have been properly scoured with common salt.

In a horse that is free from blemish, the legs and thighs are well shaped ; the knees straight ; the skin and shanks thin ; the back sinews strong and firm. The pastern joints should be small and taper, and the hock lean, dry, and not puffed up with wind. With respect to the hoof itself, the coronet ought to be thick, without any tumor, or swelling; the horn bright and of a grayish colour. The fibres of a *strong foot* appear very distinctly, running in a direct line from the coronet to the toe, like the grain of wood. Such a foot, however, ought to be kept moist and pliable ; as it is subject to fissures and cracks, by which the hoof is sometimes cleft through the whole length of the coronet. A *narrow* heel is likewise a great defect ; and, if it do not exceed two fingers in breadth, it forms an imperfect foot. A *high* heel often causes a horse to trip and stumble; while a low one, with long, yielding pasterns, is apt to be worn away on a long journey. On the other hand, a foot disproportionately large, renders the animal weak, and clumsy in its gait.

The head of a horse ought to be small, and rather lean than fleshy; his ears should be erect, thin, sprightly, and pointed ; the neck arched towards the middle, tapering gradually towards the head ; the shoulders rather long ; the withers thin, and enlarge by degrees as they extend downwards, yet so as to render his breast neither too gross or too narrow. Such are the principal characters, by which the best form and proportion of that useful animal may be determined. Those of our readers who wish to obtain more extensive information relative to this interesting subject, may with advantage peruse *Ten Minute's Advice to every Gentleman going to purchase a Horse*, &c. (12mo. 1*s*.) ; a small work, but which is replete with practical information.

[The very imperfect knowledge generally prevalent of the anatomy of this truly noble animal, has induced the Editor to give an engraving of the skeleton of the horse, from Blaine, the latest writer on the subject.

The skeleton of the horse is divided by Blaine, into head, trunk, and extremities :

EXPLANATION.

A Bones of the head.
B 7 Vertebræ of the neck.
C 18 Dorsal Vertebræ.
D 6 Lumber Vertebræ.
E 18 Bones of the tail.
F The Scapula or shoulder-blade. The spine dividing the fossæ is represented by the plain surface.
G The Sternum or breast bone.
H The humerus or bone of the arms, its head articulates with the shoulder-blade.
4 5 6 7 8 The eight true ribs so called, their cartilages being connected with the breast bone.
I The false ribs, so called from their cartillages not being inserted into the sternum, but into each other.
K The leg bones.
L The knee, formed of seven bones.
M The shank bones to which are joined two imperfect shank bones, on the back part, called by the French Epineux.
N Two triangular bones fixed to the back and upper part of the great pasterns, forming the fetlock.
O Great pastern bones.
P Little pastern bones.
Q Coffin bones.
R Pelvis, or hip bones.
S Thigh bones.
T Stifle, or knee bone.
U Hind leg bones.
V Heel of the hock.
W Oslets, or small bones of the hock.
X Instep bones.

An attention to the improvement of the breed of horses in the U. States, is a matter of great consequence. Our countrymen appear to be aware of this, and have of late imported some valuable horses; but it is still to be regretted that the country is filled with a set of worthless Stallions, possessing no prominent good quality, from which an imperfect race is propagated, to the great injury of the general interest.

The following observations on this interesting subject are taken from a pamphlet published in Philadelphia in 1795.

" It is the union of a pedigree possessing particular qualities, with a stranger, also possessing some good property, which gives perfection. By a strict attention to this principle, the English have greatly improved their breed within a few years past. They commonly distinguish horses into four kinds.

1. The race horse.

2. The hunter, uniting force with speed and spirit.

3. Coach horse, to draw light weight with agility, and to figure in Cavalry.

4. Cart or draught horse.

The race horse is the offspring of a Barbary or Arabian horse, and an English mare of the first blood.

The Hunter is the offspring of the race horse, and a mare three quarters blood, but more strongly limbed than the former.

The coach horse is the offspring of a hunter and a mare still more strongly limbed than the hunter, and half a degree less in blood.

The draft horse is the offspring of a coach horse, and the strong country mare.

This distinction of the different classes of horses, arise from physical causes, and we seldom find them employed for any purpose but that for which they are naturally fit, unless they are rendered


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inadequate by age or accident; as it is well known that a saddle horse requires a different character from that of the draught, and that the same qualities are not adapted to swift and slow motion, or to drawing heavy or light loads.

Those who wish for good horses should pay the utmost attention to the geneology of both sires and mares; the leading qualities of both should be ascertained, for, imperfections as well as perfections are transmitted to their posterity.

The race horse breed, is only a source of expense and distress to the owner, and should not be encouraged. The hunter deserves the preference; his beauty is perfect, the mode of training simple, and he demands no other attention, than that which reason prescribes. In peace, he contributes to the pleasure of his owner, and in war he preserves his rider by his speed and spirit. When unfitted by age for the saddle, he answers for a coach horse. To succeed in propagating this valuable species of horses in the United States, we must be particular in our choice of stallions, and attend to, 1. Their breed; 2. Their make; 3. Their leading character.

The breed ought to be well known; the half blood answers very well.

When the pedigree is ascertained, and he is found free from hereditary defects, as spavin, short breath, sore eyes; his figure, proportion, strength and character should be examined. The preferable kind, is the lofty, stout horse, light but not gigantic, fine figure, small head, short ears, bold front, a brown full eye with little black spots within, prominent and high; fore legs thick and broad from the shoulder to the knees, and from the knees to the joints next to the foot, lean and flat; joints thick and short; hips broad and square, *buttocks large and fleshy; hams broad.*

It is on this construction, that the perfect equilibrium of this fine animal depends: when he walks or trots, he should carry his fore feet in a perpendicular direction before him, without turning them either in or out, or rising them too high, which occasions a loss of time; the hind feet should exactly replace the fore, for if they spread, it makes him overreach himself, and occasions him to strike his hinder hoofs against his fore heels.

The mare should not have high bones, her ribs should be round, body long, and loins large. The sire and dam being matched, their leading qualities must be ascertained.

A heavy, cold, slow mare, should be joined with the fire and action of the southern horse; and on the contrary, two fiery spirits must not be united. A horse should cover but once a day, and stimulating drugs entirely avoided.

April is the best month for a mare to foal, on many accounts. Eight days after bringing forth, the stallion must be presented to the mare, and if necessary, the presentation should be repeated. Common mares may be continued in use, with safety and advantage, till some weeks before they foal. When near their time, they should be confined to a certain regimen of food, in order to avoid overloading the intestines, and thereby retarding their delivery. After foaling, the pasture should be rich, or in defect of that, short feed should

be given, such as broken Indian corn, or coarsely ground oats or beans. Horses reared in marshy shady meadows never thrive."

The general opinion of breeders has been, agreeable to the advice above given, respecting the crossing of the breed: and a decided testimony in favour of it has lately been given by Mr. A. Knight, in the *Transactions of the Royal Society*, London, 1799, part 2d; and yet it is well known that the celebrated English breeder, Bakewell, did not accede to the opinion, but always bred from his own stock, until he procured another, the qualities of which he wished to propagate, and unite to those of his own.

The proper mode of shoeing horses, being an affair of great consequence, and as little understood by the greater part of those who own horses, as by the blacksmith; ample directions shall be given on the subject, taken from the late excellent work, by Mr. E. Coleman, Professor of the *Veterinary College*, *London*, entitled "*Observations on the structure*, &c. *of the foot of the Horse*," London, 1798.

The whole of the hoof is composed of horny fibres, without sensation. The crust or wall surrounds the anterior and lateral parts of the foot. It is the only part that can receive nails without mischief, is thicker at the toe than the quarters, and generally thicker at the outer than at the inner quarter. The union of the crust with the coffin-bone sustains the weight of the animal. The horny sole is concave on the outside, beginning at the junction with the crust, and increasing as it advances towards the centre, so that the edge of the sole, united to the crust, is least concave.

The bars or binders are two in number, and are placed between the frog and sole; and at the heels, form a broad solid junction with the crust. Their use is to keep the heels expanded. In a *natural* hoof there are two large cavities between the frog and bars.

The frog is an insensible body, placed in the centre of the sole, of a wedge-like form, pointed towards the toe, and expanded as it advances to the heels. In the centre of the broad part there is a fissure or separation.

The practice of shoeing very much depends on the functions of the frog being understood. As its convexity must make it liable to touch the ground at every step, we conclude it was intended to receive pressure. Paring the frog therefore, and raising it from the ground by a thick heeled shoe, annihilates its functions, and produces disease.

Common practice of shoeing Horses, and its consequences.

Before any shoe is fitted to the hoof, the bars are totally, and the frog partly removed by the butteris. This removal is termed opening the heels; when the hoof is thus prepared, a shoe is applied thicker at the heel than at the toe, broad in the web, having its upper surface convex, and four nails placed in each quarter. The high heels of the shoe prevent the frogs from embracing the ground, and the concavity of the shoe at the quarters, and the nails (that are placed near the heels) will confine the growth of the crust, and contract the hoof.

Practice of shoeing Horses, which preserves the foot in health.

The first thing to be attended to, is to take away a portion of the sole, between the whole length of

the bars and crust with a drawing knife. The heels of the sole, cannot receive the pressure of the shoe, without corns. The sole must be made concave, and not allowed to come in contact with the shoe. The heels of the shoe should be made to rest on the junction of the bars with the crust, but if the bars be removed, then the shoe is supported by the crust only, and not by the solid broad basis of crust and bars united. When the shoe is applied, the cavity between the sole and shoe, should be large enough at every part to admit a large horse picker, and particularly between the bars and crust. If a picker cannot be admitted, then it is requisite to make either the sole or the shoe concave.

The bars and frog should never be removed, but ragged parts of the latter may be cut away. Where the heels are higher than the frogs, lower the heels by a rasp or butteris, for in *every case we are to endeavour to bring the frog in contact with the ground.* Nevertheless, where the frog has been disqualified for its functions for a considerable period, and become soft, it must be accustomed to pressure by degrees. Thus at every time of shoeing, the hoof may be lowered about the tenth of an inch, until the frog be hard, and equally prominent with the heels; or if the horse be not required to work, great advantages will be derived from standing without shoes on hard pavement.

By reducing the heels of the shoe, in the same proportion as the hoof grows, a thin heeled shoe, may, in a few months be employed; and yet the horn being preserved at the heels, and cut at the toe, every time of shoeing, the heels (shoe and hoof together) will be as high, and frequently higher, than when the former thick heeled shoes were applied. The crust that descends at the heels, we allow to remain, but subtract an equal quantity of iron from the heels of the shoe, and as much horn as possible from the toe of the hoof. This system should be continued, until the heels of the shoe are about one third the thickness of the toe.

But as the feet of horses are so variously deformed by bad management, it will be requisite, in shoeing, to attend to each particular kind of hoof. If any form of shoe be indiscriminately employed for all kinds of feet, it must frequently fail of success, but by attention to the different hoofs, we can generally improve the whole foot so as to adapt the shoes here recommended, with advantage.

The shoe must be varied in its length, breadth and thickness at the heel, and surface, according to the hoof. If the heels of the fore feet, are two inches and a half, or more in depth, the frog sound and prominent, then only the toe of the hoof requires to be shortened, and afterwards protected by a short thin heeled shoe.... A common sized saddle horse-shoe, may be about three-eighths of an inch thick at the toe, and one-eighth at the heel. But unless the hoof has been properly preserved, the heels and frog are generally too low, to receive the short shoe. The toe of the hoof requires to be shortened as much as possible, but if the frog touches the ground, no part of the heels should be cut. During the wet months, we protect the whole crust by a

long shoe ; and if the heels of the hoof are low, we employ the same shoe in summer.

Young horses with perfect feet, that have never been shod, or horses taken from grass, do not always admit of horn being taken from the toe ; and where only a small quantity of the toe of the crust can be removed, the heels of the shoe should not at once be made thin, as a temporary lameness may ensue. But if the crust can be removed at the toe, nearly in the same degree as the part is to be covered with iron, and if the frog be sound and prominent, then a thin heeled shoe may at once be employed with success.

A shoe and nails for a moderately sized coach horse, should weigh from 18 to 20 ounces. A saddle horse shoe with nails, about 12 or 14 ounces ; width at the toe six-eighths of an inch, but one-fourth less at the heel. The toe of the shoe may be three-eighths of an inch thick on the outside ; the inside of the toe and the heel one-eighth. Some little variations will be occasionally requisite.

The shoes of cart-horses, should be three times thicker at the toes than at the heels, provided this quantity is not worn out before the toe.

In general the heels of the short shoe, should terminate about three-fourths of an inch from the heels of the crust (see the plate), but the heels of the long shoe should rest on the junction of the bars with the crust, behind the seat of the corns. The length of the shoe commonly employed, is between both ; the heels are generally opposite the seat of corns, and the length of the shoe contributes to produce the disease. The shoe when first applied, is adapted to the hoof, but before the expiration of the month, the hoof descends, is expanded, and frequently becomes too large to fit the shoe ; and then the heels of the shoe, that were at first equal with the crust press upon the horny sole, bruise and inflame the sensible sole, and occasion corns. The short shoes are not allowed to approach the seat of corns, and then the heels of the sole having great freedom of motion, this disease is prevented. And where long shoes are properly employed, if the heels rest on the junction of the bars with the crust, and if the sole between the bars and the crust is removed, corns are equally avoided.

The shoe mostly recommended by the Veterinary College, is partly flat, and in part concave, on its upper surface. The flat portion of the shoe, is intended to rest only on the crust, while the concavity of the shoe is supposed to be opposite the sole, and the nails are placed in the centre of the seat, or flat part of the shoe. The principle of this shoe, is to prevent any part of the sole from receiving pressure, and to oblige the crust to support the whole weight of the animal.

If the whole of the sole be sufficiently thick to admit of being concave, then the whole internal surface of the shoe may be made flat. But where the sole towards the toe is convex, or flat and very thin, a shoe altogether flat, or a flat seat, with the nails in the middle, cannot be applied without improper pressure. But I have scarcely ever seen an instance, where the sole could not be removed, the first or second time of shoeing, between the whole of the bars and the crust.

For flat soles, the form of the shoe is concave at its upper part, opposite to the flat or convex portion of the sole with a narrow surface, only equal to the crust and nails; but at the quarters and heels, where the sole can be made concave there it is necessary to employ a flat surface. If the bars and sole at the heels have been destroyed by the farrier, so as to prevent the possibility of making a concavity between the bars and the crust, and if the horse be obliged to work, then it will be necessary to employ a bar shoe to rest on the frog, and raised from the sole at the heels. But where the sole can be preserved only for a few weeks, it will grow sufficiently to be made concave with a drawing-knife between the bars and crust, and then the heels of the shoe may be flat, without touching the sole.

The best form for the external surface of the shoe, is a regular concavity; that is, the common shoe reversed.

The nail holes, and the nails, are stamped with a punch of a wedge-like form (see the plate), and the heads of the nails are of the same figure, namely conical, and received into the nail holes; and then so long as the shoe remains, so long there are heads to the nails.

The shoe should be nailed all round the toe of the crust. The toe is by much the thickest part of the crust in the fore hoof*, and therefore capable of receiving nails, with less danger of wounding the sensible parts within, than at the quarters, where the crust is generally thin, and by preserving the greater part of the quarters free from nails, the heels are allowed to expand.

About one inch and a half of the heels of the shoe may be generally left without nails: but on a bar-shoe, the nails should be carried nearer the quarter on the outside, than the common shoe, or it will be liable to be detached from the hoof.

When a horse cuts, the outer quarter of the crust should be lowered, and the interior quarter preserved. But when the sole is thin, the inner quarter of the shoe should be thickened, and the outer quarter made thin, which will produce the same effect as altering the horn. If the toes of the hoof turn in, the inner quarter of the hoof only, should be lowered, and the outer quarter of the shoe made thicker than the inner quarter.

Explanation of the Plates.

Fig. 1. A view of the natural hoof of the horse, being of a circular form, and shod with a short shoe.

a a a The external surface of the sole, of a concave form.

b b The inferior edge of the crust at the heels.

c c The junction of the bars with the crust.

d d The point of the bars.

e e The sole between the heels of the crust and bars, the seat of corn.

f f The heels of the short shoe, not allowed to reach the seat of the corn at *e e*.

g The toe of the frog.

h h The heels of the frog.

i i The cleft between the heels of the frog, the external seat of thrushes.

k k Two cavities between the sides of the bars, and the sides of the frog.

* In the hind feet, the quarters and toe are nearly all of the same substance.

A hoof shod with a long shoe, would extend to *e e*, and if there be a corn on the foot, a semicircle must be cut out of the shoe, directly over it, to prevent pressure from the shoe.

Fig. 2. View of the hoof, with contracted heels, produced by the common method of shoeing.

a a a The sole.

b b The original seat of the bars.

c c The seat of the original cavities, between the bars and the crust, but now, from contraction, solid horn.

d d The frog very much compressed by the contraction of the heels of the crust.

e e The width of the hoof at the heels, not being more than one half of its length, from *f* to *g*.

f The extremity of the heels of the frog.

g The toe of the crust.

Fig. 3. A punch with a wedge point to make the nail holes.

Fig. 4. A nail with a wedge head, of the same form as the point of the stamp.

Fig. 5. A nail with a common head.

A patent has lately been taken out by JOHN WILLIAMS, in England, for a method of disengaging horses from carriages, when they take fright. The simplicity of the process is said to be so great, that the operation is performed with as much facility as the pulling of a check-string, while at the same time horses are as securely attached to the carriage, as upon the common construction.

ANDREW LEETH and Co. Shoe-lane, Fleet-Street, London, are the manufacturers of these "Saseguard Splinter-bars.

The specification is detailed in the first volume of the new series of the "*Repertory of Arts*," with a plate.]

HORSE-BREAD, an expensive preparation given to horses, and consisting of wheat, oats, and beans; to which are sometimes added, aniseed, liquorice, eggs, and ale; at others, rye and *white-wine*.

There are three kinds of bread usually allowed to *race-horses*, for the second, third and fourth nights' feeding: all of which are prepared with *wheat*, and *beans* worked with *yeast*; the difference in the proportions is as follows: in the first sort, a triple quantity of beans is used to one part of wheat; in the second, equal portions of both are employed; in the third, three-fourths of wheat are added to one part of beans.

These artificial stimulants, however, produce only a temporary effect; nor do they contribute to the future health and prosperity of the horse. Indeed, we doubt whether, in the present unprecedented state of the market, *horse-racing* can be reconciled to the principles of justice and humanity; unless it be admitted, that the fluctuating, though always exorbitant, price of corn, within the last two years, must be attributed chiefly to the vile arts and evasions of the law, practised by monopolizers, regraters, forestallers, &c. These pests of society have apparently succeeded in creating a *constant fictitious scarcity*, which, it is to be apprehended, will prevail, and elude the utmost vigilance of the magistrate, till the *circulating medium* be regulated, and the bank-notes of private individuals reduced to their true value.

After this involuntary digression from the subject, we shall conclude

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

with stating a very useful practice that is followed in many parts of Denmark and Germany, with a view to preserve the health of that noble animal, the horse; and at the same time to keep him in "good order." It simply consists in mixing a handful of the dried and pulverized seed of the common nettle, every morning and evening, with his allowance of oats. Others add a handful of salt to each meal, and occasionally a few boiled carrots, which remarkably contribute to render his flesh plump and firm. Of the good effects of nettle-seeds, we can speak from experience, having frequently observed that they improve the *coat* or hair of the animal, by producing an uncommon gloss and smoothness.

[HORSE-CHESNUT, or *Æsculus*, L. See CHESNUT.]

HORSE-FLY, or *Hippobosca*, L. a genus of insects, comprising four species: the principal of these is the *equina*, or Common Horse-fly, which equally torments horses and cows.

The horse-fly is broad, flat, shining, and apparently covered with scales, its head, breast, and belly, are of a yellowish colour, streaked with brown. These insects are very difficult to be killed, on account of the hard scaly wings with which they are covered; and so firmly do they adhere to the poor animals, that these can neither rub nor bite such pernicious vermin off their skin, without severely wounding themselves. Hence the only preventive we can devise, is a net for covering the horse in hot weasher, or in travelling through woods, or such places as are infested with these troublesome flies.

HORSE-MEDICINES, an appellation given to such drugs as are prepared exclusively for the use of horses, in particular disorders. As many accidents happen from the ignorance of pretenders, we shall offer a few hints, together with recipes, that may be useful in ordinary cases.

I. PURGES are frequently rendered necessary in full grown horses of gross habits, for disorders of the stomach and liver; they ought, however, to be administered with great caution, and their strength proportioned to that of the animal; for, as these medicines frequently continue 22 hours in the body previously to passing off, they are apt to cause gripes, accompanied with excessive cold sweats, and to occasion inflammation, which frequently terminate in gangrene and death.

Purges ought to be given early in the morning, upon an empty stomach; three or four hours afterwards, the horse should be fed with scalded bran, when a little hay may be allowed him. All his drink ought to be lukewarm, and a little bran should be mixed with it; but, if he refuse this mesh, pure water may be given. While the dose is operating, the animal should swallow copious draughts of warm water; or, in cases of refusal, be indulged with cold drink, in order that the purge may pass off the more speedily.

The following preparations are extracted from those, the character of which is established among sportsmen, for their utility on sudden emergencies.

1. Take from 10 to 12 drams of aloes; of myrrh and ginger, each half an ounce; of saffron half a dram; or, if botts are suspected, add one scruple (20 grains of ca-

lomel, or fifteen of red precipitate.

2. Let 10 drams of Socotrine aloes: half an ounce of myrrh finely pulverized; one dram of saffron, and a similar quantity of fresh jalap, both in powder, be well mixed together, and formed into a solid ball, with the addition of [molasses.]

3. Infuse two ounces of senna in a pint of boiling water, with three drams of salt of tartar, for two hours; when it is to be poured off, and four ounces of Glauber's salt dissolved in it, together with two or three ounces of cream of tartar. This preparation is reputed to be cooling, easy, and speedy in its operation; it is preferable in cases of sudden inflammations to any other dose; as it is said to pass into the blood, and also to operate by urine.

The following cathartic balls are recommended by Mr. Taplin; and the ingredients of which they consist, are proportioned to the age, strength, size, and constitution of different horses.

1. Socotrine aloes, one ounce; rhubarb, two drams; jalap and cream of tartar, each one dram; pulverized ginger, two scruples; oil of aniseed, twenty drops; and as much [molasses] as will form the whole into a ball.

2. Socotrine aloes, ten drams; rhubarb, jalap, and ginger, each two drams; cream of tartar, three drams; and a sufficient quantity of [molasses] to form the ingredients into a ball.

3. Barbadoes aloes, nine drams; jalap, Castile soap, and cream of tartar, of each two drams; ground ginger, one dram; and the same proportion of [molasses] as above stated.

4. Barbadoes aloes, ten drams; Castile soap and Jalap (in powder), of each half an ounce; cream of tartar and ginger, each two drams; oil of aniseed, forty drops; these are to be formed into a ball, with syrup of any kind.

In preparing these balls, it will be requisite to give them an oval form; but if they exceed the size of a small hen's egg, they ought to be divided into two doses, and dipped in oil, in order that they may pass the more easily down the horse's throat.

II. Clysters are of considerable service, in relieving the animal from various acute complaints: hence they should be carefully administered lukewarm. Their composition ought to be extremely simple, so that they may be easily prepared, and given on sudden emergencies.

Clysters are distinguished by various names, such as emollient, laxative, diuretic, &c. of these we shall specify such as may be speedily procured, together with the cases in which they may be resorted to with advantage.

1. *Laxative Clyster.* Let two or three quarts of thin water-gruel be mixed with eight ounces of Glauber's salt, to which are to be added, six ounces of sweet oil.

2. *Emollient Clyster.* Take two or three quarts of thin water-gruel, six ounces of coarse sugar, and a similar proportion of salad-oil. The whole is to be well mixed, and injected lukewarm. These two preparations will be fully sufficient to promote a free discharge in sudden obstructions, inflammations, &c.; they are, in general, fully as efficacious as the more costly compounds.

3. *Purging Clysters.* Infuse two ounces of senna in boiling water;

after having stood a sufficient time it is to be strained, and [half a pint of molasses,] with an equal quantity of salad-oil, are to be carefully incorporated with it....This will operate more speedily than either of the preceding mixtures, and is therefore preferable, when immediate discharges become necessary.

[Another. Common salt a small handful, lamp or sweet oil, a pint, molasses a pint, water one quart, inject by means of a large pewter syringe. This remedy is highly useful in cases of over feeding, and should be repeated every half hour, until the bowels are fully evacuated.]

In case of sudden or apprehended inflammations, in the bowels, the following is the most proper:

4. *Anodyne Clyster:* it consists of one pint of the jelly of starch, or infusion of linseed, and one ounce of liquid laudanum, properly mixed, and immediately administered: if the symptoms increase, from 30 to 40 grains of opium may be substituted for the laudanum, according to their urgency.

5. *Nourishing Clyster.* Three quarts of thick water-gruel, with two or three table-spoonsful of honey. When clysters of this kind become necessary, they ought to be given four or even five times in the course of a day, as circumstances may require. They are very serviceable in cases of locked jaw, inflammations of the throat, &c.

6. *Diuretic Clysters.* Take Venice turpentine, two ounces; Castile soap, one ounce. These are to be well beaten up with the yolk of two eggs, and then diluted with two quarts of warm water. Such a clyster is of great service in the strangury, and all obstructions of the urinary passages: if speedily administered, it seldom fails to afford complete relief.

These few clysters are amply sufficient for common exigencies; and, with a few alterations, which every skilful person is able to adopt will answer almost every purpose.

[*Diuretic mash.* Dissolve half an ounce of *salt petre* (nitre) in a quart of strained flaxseed tea, and mix it with bran for his food.]

III. POULTICES are of such utility, as to deserve a place in this collection. We shall, therefore, subjoin two preparations which may be safely applied in cases of accidental wounds.

1. *Digestive Poultice:* Take such a quantity of oat-meal or coarse wheaten flour, and beer-grounds, as may be required on the occasion: with these are to be mixed common turpentine and hog's lard, one ounce of each, previously melted together, and the whole boiled to the consistence of a poultice.

2. *Emollient Poultices:* Take half a pound of oat-meal, or coarse wheaten flour, and a similar quantity of pulverized linseed. These are to be boiled in milk and water, to the consistence of a cataplasm, when one ounce of sal ammoniac in powder should be added. The emollient poultice may be applied to wounds attended with great heat, inflammation, or swelling: by the addition of fresh butter, lard, or oil, it may be rendered more relaxing, so that it will speedily remove the tension of the skin, while it attenuates the viscid and obstructed juices.

IV. POWDERS. The chief pow-

der employed in farriery is that of *Dia-pente*; which consists of equal quantities of gentian, barberries, myrrh, the shavings of ivory and round birthwort (*Aristolochia rotunda*, L.) These are to be carefully pulverized, sifted, and weighed, so that the exact proportions be mixed; after which they are to be kept perfectly secluded from the air. This powder generally forms an ingredient in other medicines, and is of considerable efficacy in the Farcy (which see:) it is likewise mixed with muscadine wine, sack, or ale, and given as a kind of diet-drink to horses affected with colds, coughs, inflammations in the blood or liver, and various other affections: as it tends to purify the humours, and to clear the bowels of infectious or corrupt matter. The last class of medicines that deserve attention, are:

V. Diet Drinks, which are generally used in cases of surfeits, or similar disorders; for this purpose, the following receipes may be useful:

1. *Lime-water*, prepared with shavings of sassafras and liquorice, is well calculated to purify the blood, and may occasionally be given, together with balls consisting of pulverized salt-petre, mixed with honey; so that two or three ounces of nitre be taken in the course of twenty-four hours.

2. *Tar-water* may in many cases, and especially when the appetite is impaired, be administered with advantage; but let it be remembered, that all medicines of this nature ought to be continued for a considerable time, in obstinate maladies; for, otherwise, there will be no chance of success.

Lastly, as many diseases of the horse arise from obstructed perspiration, in consequence of his being suffered to stand in the stable, and become cool after fatiguing labour, we can from experience recommend a mesh, consisting of two or three gallons of lukewarm water, in which half a pound of honey is dissolved, with the addition of a few handfuls of barley-meal, or malt dust: such a draught ought to be allowed morning and evening for several days, whenever it is apprehended that the animal has taken cold, or been otherwise injured by violent exertions.

[For *Sore Eyes*. Dissolve half an ounce of sugar of lead in a quart of water, and bathe the eyes frequently with a linen cloth dipped therein. When the inflammation has subsided, and the eye continues to run from weakness, add $\frac{1}{4}$ oz. of white vitriol to a pint of the above water. For other diseases See the several articles.

Under art. Horse it was intended to treat of the *best draught of horses or oxen*, but in order to make this article more complete, it must be deferred until we come to the article Wheel-carriages.]

HORSE-RADISH, or *Cochlearia Armoracia*, L. an indigenous perennial plant, growing on the sides of ditches, the banks of rivers, and other damp places; flowering in the month of May.

It has a strong pungent smell; a penetrating acrid taste; and is refused by every kind of cattle.... The root, when scraped, is much used at the table as a condiment for fish, roast beef, &c.; it is also employed for many other culinary purposes; and might in times of scarcity, afford flour for bread. With this intention, however, the

roots ought to be collected in autumn, and treated in the manner already described. [See art. CASSAVA and CHESNUT.] But, if horse-radish be intended for immediate use, it ought to be dug out of the ground *fresh*, only from October to March; or to be gathered in the spring, then dried, reduced to powder, and preserved in bottles closely stopped, for occasional use; when it should be previously moistened with spring water. When steeped and digested in vinegar, during a fortnight, this root is said effectually to remove freckles in the face.

In paralytic complaints, horse-radish has sometimes been applied, with advantage, as a stimulating remedy to the parts affected. A strong infusion of it excites vomiting; and is greatly recommended by SYDENHAM in dropsies, particularly such as succeed intermittent fevers. Prof. BECKMANN mentions this vegetable among the most proper substances for tanning or currying leather.

[A syrup made by boiling scraped horse-radish in brown sugar, is an excellent remedy in the decline of colds and of pleurisies, to promote expectoration. A tea-spoonful may be taken frequently, and permitted to dissolve in the mouth.]

HORSE-SHOE-HEAD, an affection of the heads of infants, in which the sutures of the skull are too open, or too great a space occurs between them; so that the aperture is frequently not closed, or the cranium in that part does not become hard and firm, till the age of puberty. This opening increases as often as the child takes cold; and, if it continue for a long series of years, it is generally regarded as a sign of weakness, or short life. In this case, the usual practice is to rub the head occasionally with warm rum or brandy, mixed with the white of an egg, or a little palm-oil: it will also be advisable to wear a small cushion over such aperture, by which it will not only be protected from the cold air, but likewise from receiving sudden injury; and consequently the closing of it will be promoted. Such infants ought to be watched with additional care to prevent any accidental falls, or blows, on the head, which to them would be fatal....See also FOOD.

HORSE-TAIL, or *Equisetum*, L. a genus of perennial plants, comprising eight species, six of which are indigenous: of these, the following are the principal:

1. The *Sylvaticum*, or Wood-horse-tail, which grows in moist woods, shady places in the vicinity of rivers, and on boggy soils: it flowers in the months of April and May. Horses eat this plant with avidity; and, in some parts of Sweden, it is collected for the purpose of serving them as winter-food.

2. The *arvense*, Common, or Corn horse-tail, growing in wet meadows and moist corn-fields. It is a most troublesome weed in pastures, and is seldom touched by cows, unless pressed by hunger, when it occasions an incurable diarrhœa: it is eaten with impunity by horses, but is noxious to sheep. This rough grass is employed for cleaning and polishing tin vessels. According to GLEDITSCH, this species, as well as the *fluviatile*, or River-horse-tail, are of considerable service in tanning or dressing leather.

3. The *palustre*, Marsh-horse-tail, or Paddock-pipe, which flourishes in marshy and watery places; flowers in the months of June and July. It is not so strong as the preceding species, but is equally prejudicial to cows: farther, it is very troublesome in drains, *within* which it vegetates, and forms both stems and roots, several yards in length: thus the course of the water is interrupted, and the drains are totally obstructed. To remedy this inconvenience, the reader will consult the article DRAINING.

4. The *hyemale*, Rough Horse-tail, Shave-grass, Pewterwort, or Dutch Rushes, is found in marshy, watery soils, and flowers in the months of July and August. This species is wholesome for horses, by which it is eaten; but it is hurtful to cows, and disagreeable to sheep. It is chiefly employed by turners and cabinet-makers, for polishing their work; as well as by dairy-maids, for cleaning pails and other wooden utensils.

HORSE-WORM. See BOTTS.

HOSPITAL, a building properly endowed, or otherwise maintained by voluntary contributions, for the reception and support of the poor, sick, infirm or helpless.

Few countries abound with a greater number of these humane institutions than Britain; yet they are often calculated to generate disease rather than to cure it, on account of their crowded wards, or from their confined situation in populous cities, where the most pestilential vapours are in a manner condensed; and thus, in too many instances, the victims of poverty, age infirmity, or sickness, eventually perish by mutual contagion.

Much, we are convinced, has already been done towards remedying an evil of so serious a nature; but still more remains to be accomplished, before salutary changes produce the desired effect in this neglected department of medical police. We mention these few circumstances, in order to excite a greater degree of attention to this important object, in which the salubrity of the metropolis is particularly concerned. Those of our benevolent readers who wish to acquire further information, ought to read the *Extracts from an Account of the Institution for the Cure and Prevention of Contagious Fevers in London*, lately published; as well as Mr. AIKIN'S *Thoughts on Hospitals* (8vo. 1*s*. 6*d*. Johnson, 1771): both pamphlets equally abound with interesting facts and observations.

HOT-BEDS, in gardening, are made either with fresh horse-dung or tanners' bark, and covered with glasses, to protect them from the severity of the wind and weather.

Where horse-dung is employed, a trench should be dug, of a width and depth proportioned to the size of the frames intended to be used; and which, in dry ground, ought to be a foot, or a foot and a half, deep; but, if the soil be wet, it should not exceed six inches. The dung is then to be spread even and smooth on every part of the beds, laying the finer manure on the surface: if the bed be intended for planting out cucumbers, a hole should be made, about ten inches broad, and six inches deep, in the middle of the place destined for each light, and then filled up with good fresh earth. The bed is next to be covered, to the depth of four

inches, with the earth taken out of the trench, and the frame fixed over it, to remain till the earth become warm, which commonly takes place in the course of 3 or 4 days after the bed is made; when the cucumbers may be planted.

In case the hot-bed be designed for other plants, it will not be necessary to make holes in the dung; but, after levelling the surface, good earth ought to be spread over it, to the depth of three or four inches; the frames and glasses being put on as before. In making such beds, the dung, should be settled close with a fork; and if it be full of long litter, it must be trod down equally in every part. In the first week, or ten days, after the hot-bed is made, the glasses should be slightly covered during the night, and cautiously opened in the day time, to give vent to the steam; but as soon as the heat abates, the covering should be increased by mats or straw; and, when the bed becomes cold, fresh dung should be applied to its sides.

Hot-beds made with tanners' bark are preferable to those above described, especially for tender exotic plants and fruits; as they require a more equal warmth than can be produced by horse-dung. The method of making them is as follows: a trench is dug about three feet deep, if the ground be dry; but, if the soil be wet, it ought not to exceed the depth of a foot, and should be raised two feet above the ground. Their size must be in proportion to the frames intended to cover them; though they ought to extend at least 10 or 12 feet in length, and six feet in width. The trench should be lined with bricks on each side, to the height of three feet, and filled in the spring with fresh tanners' bark, which should be previously thrown up into a round heap, in order to drain for three or four days. When the tan is laid on, it ought to be gently beaten down with a dung-fork; for, if it be trodden in, it will be prevented from heating, as it settles too close. The frame and glasses are now to be fixed; and, in the course of ten days or a fortnight, the bed will grow hot, when pots or plants of seed may be plunged in it; care being taken that the bark be not compressed. These beds will preserve a proper temperature of heat for three or four months, which may be continued two or three months longer, by adding a load or two of fresh bark, as often as the warmth begins to decrease.

Frames vary in size, according to the plants they are destined to cover. If designed for ananas or pine-apples, the back should be three feet high, the lower part fifteen inches: when the bed is intended for taller plants, the frame must be made proportionally higher; if for seeds only, it will not be necessary to employ frames more than fourteen inches in height at the back, and seven in the front. Thus, the heat will be increased, and the growth of the plants considerably promoted.

HOT-HOUSE, a building erected for the purpose of raising such exotic plants, as, from their extreme tenderness, are unable to withstand the effects of a cold or variable climate.

The construction of hot-houses, in general, differs little from that of GREEN-HOUSES; because the design of both is to receive as much benefit as possible from the genial warmth of the sun, assisted by the

heat artificially procured from subterraneous stoves and flues.....We shall, therefore, at present, only give an analysis (from the 1st vol. of the second series of *Recreations in Agriculture*, &c.) of the principle on which Dr. ANDERSON's improved hot-houses are constructed, and for which he has lately obtained a patent.

He first points out the defects in the present method of erecting hot-houses; in consequence of which the heat of the sun is not employed with that advantage of which it is susceptible. In the prevailing mode of building these houses, the roof glasses are, with very few exceptions, laid into the frames, by folding one frame over the other, and thus leaving an open space between each pane; through which the air has a free passage, while the front panes are closely covered round with putty. This communication with the open air at the upper part of the house, is their chief imperfection: for the power of the morning sun is thus lost for several hours; and, in the evening, when the warm air within begins to cool and to contract in bulk, the cold air from *without* rushes in through the top or roof-glasses, cools the whole house in the most expeditious manner, and thus counteracts the influence of the solar rays.

To remedy these inconveniencies, the patentee proposes the following plan of construction, for houses designed to force vines, or such plants as require a similar temperature. The house is to be built of the usual dimensions, but with a glass roof perfectly flat; and, as it never requires to be opened, all the seams or junctures between each pane are to be carefully closed with lead and putty. Over this flat ceiling, another sloping roof is to be erected, and covered either with slate, or likewise with glass, which will better answer the purpose. The upper chamber, which will thus serve as a reservoir for the heated air, communicates with the common atmosphere only at its lower part, that is, immediately over the roof of the lower house; and there is a contrivance for another occasional communication with the latter, by means of a pipe or tube, that extends from the top of the upper chamber, almost to the ground below.

By this construction, as soon as the sun expands the air in the lower house or chamber, a part of that air rises through the tube into the upper chamber; where it ascends to the top or roof, forcing out the cooler air contained in the upper chamber, which passes off through the openings left above the floor of this chamber, or in the roof of the lower room.

During the whole of this heating process, the vines, which are trained along, beneath the glass roof of the lower chamber, are surrounded with heated air. In the evening, when the influence of the sun is withdrawn, the warm air begins to cool, and consequently to contract its bulk; thus the external air rushes in, through the aperture immediately over the lower glass roof, into the upper chamber. This cold air being heavier than that within the house, it can only enter as the latter recedes; the current through both chambers is now exactly reversed; and the lower room receives all the warm air from the reservoir or upper one, before the cold can reach it.

Dr. ANDERSON is of opinion, that a few hours sun-shine will at any time be sufficient completely to heat the house in which vines are planted; and thus, without any artificial heat from fuel, a permanent warmth may be maintained, which is sufficient to ripen grapes, in favourable weather, as early as in the months of June, July, and August. He farther suggests, that the upper chamber may be converted into an hot-house of inferior rank; and that it would be eminently calculated to serve as a substitute for a green-house or conservatory.

Such is the outline of this very ingenious plan, and the inquisitive reader who wishes to acquire more minute information on this subject, will probably resort to the volume already quoted, where it is amply treated, and illustrated with cuts.

[Dr. W. adds the following account of a new plan in his supplement.]

A glass frame for buildings of this description has lately been invented by M. BENARD: it possesses considerable advantages over those in common use. The lower part consists of a double square of glass-panes set in wood, or in wood and lead. The upper part is composed of panes of glass fixed in wood, and terminates in an oblong six-sided prism: it may be taken of at pleasure, by a ring connected with the top......The whole of this fabric has the singular advantage of throwing a great body of light on the plants, while it prevents that sickly growth, denominated *etiolation*; and renders it easy to produce a variety of temperatures, as occasion may require. M. BENARD's hot-house is supplied with heat, at a trifling expense, by common oil; the smoke of which is conveyed round the frame, by means of a flue.

Hot-houses are liable to be infested with a variety of insects known under the different appellations of *Cocci*, *Aphides* (lice), &c. that harbour in the walls, and among the trellises, which fasten up vines, and other wall-fruit trees, especially during the winter. In order to destroy these vermin, Mr. SPEECHLEY recommends the walls to be washed with common *soap-suds*, early in the spring, while they are in a torpid state: this liquor is to be poured out of a watering-pot from the top of the wall downwards; and ought when used, to be considerably warmer than new milk: thus, if the suds be properly and plentifully applied, the wall will assume a pale red colour, and the insects be effectually destroyed.

HOUND, an appellation given to dogs of chace.

Hounds of the middle kind are deemed to be the best, being stronger than such as are either very small, or of a large size..... The shape of these animals should be carefully attended to, as they can neither run swift, nor perform great tasks, if their limbs are not well proportioned. A good hound ought to have straight legs, round small feet, and well-formed shoulders; his breast should be rather wide than narrow; his chest deep; his back broad; his head small; his neck thin; his tail thick and bushy. Young animals that are weak from the knee to the foot, should not be suffered in the pack; and all the hounds should be nearly of a size.

Particular attention is requisite in the breeding of hounds. No old

dogs should be admitted, nor should any attempts be made to cross the breed. The months of January, February, and March, are the best for breeding. As, however, this quadruped is less connected with purposes of economy than amusement, we shall content ourselves with referring the curious reader to Mr. BECKFORD's "*Thoughts on Hunting*," (4to. 10. 6*d*.) in which the subject is fully and perspicuously treated.

HOUND'S-BERRY: See CORNEL-TREE.

HOUND'S-TONGUE, or *Cynoglossum*, L. a genus of plants consisting of eight species, two of which are natives of Britain: the principal of these is the *officinale*, Common Great Hound's-tongue, or Dog's-tongue, which is frequently found on road sides, and among rubbish; where it flowers in June. It is eaten by goats, but refused by sheep, horses, hogs, and cows. Its scent is very disagreeable, and resembles the odour of mice.

This plant has a bitter taste, and is so powerfully narcotic, that persons who had eaten it as a culinary vegetable, were laid into a profound sleep for fourteen hours; and others died in consequence. The roots, however, were, according to RAY, employed by Dr. HULSE, who prescribed a decoction of them internally, and cataplasms externally in scrophulous cases. The leaves and roots have likewise been recommended for the same purposes, and also for coughs, dysenteries, &c. on account of their mucilaginous, astringent, and sedative qualities, of which we have had no experience.

[The *Cynoglossum Virginianum*, is a native of the United States. The leaves when used as tobacco to smoke, intoxicate. According to CLAYTON; the root is astringent, and is given in diarrhœas.]

HOUR, a measure of time, equal to the 24th part of the natural day, or that space of time which the earth requires to perform its diurnal revolution round its axis. The hour is divided into 60 minutes, each of which is divided into 60 seconds, as every second is into 60 thirds. See TIME and WATCH.

HOUR-GLASS, a kind of chronometer, employed by navigators, as well as by some artisans and mechanics, to measure the passing of time, by means of a descent or running of sand, out of one glass into another.

The best hour-glasses are those which are filled with egg-shells, well dried in an oven, finely pulverized, and sifted; as they shew the passing of time with greater exactness than common sand.

HOUSE, a habitation or edifice suited with conveniencies for the abode of man.

The chief requisites in construcing houses are, situation, durability, and convenience, of which we have already treated under the article BUILDING; we shall therefore only notice an expired patent granted in 1786 to Mr. DENNIS M'CARTHY, for his then new-invented compound, applicable to the formation of tiles.

The patentee directs three bushels of Thames sand, or any white *fluxing* sand, to be mixed with a bushel of salt, and calcined in a kiln or furnace till it become a hard substance. These ingredients are

then to be ground fine, and one bushel of them mixed with an equal quantity of white clay, or whiting, to which are to be added one bushel of calcined ground flint, or ground glass; plaister of Paris may also be mingled with the clay, if the latter article cannot be easily procured; and, by the addition of smalt, the compound may be made of a beautiful slate colour.

When the ingredients are mixed together, and moistened with water, they should be worked till they acquire a consistence proper for casting them into moulds. The pieces, or tiles thus formed, are next to be burned in a furnace, or kiln, the fire being confined by funnels or muffles. The size of these tiles depends on the distance of the rafters, on which they are to be placed in such a direction, that the joints may meet in the centre, and either fold over, or fix into each other exactly; in which state they are to be fastened by pegs, screws, spikes, &c. when the joints are to be closed with stone cement, tarras, or fine mortar....A more particular account of this invention will be found in the 11th vol. of the *Repertory of Arts and Manufactures*, where it is fully specified.

[Under the articles, Country-house, Architecture, and Building, may be found some general observations on this subject, which deserve attention. At present some additional instructions shall be given, as the result of much inquiry among practical men,

1. In the first place, it is of the greatest consequence to procure well seasoned timber for joists. Wood differs very much in durability, and yet the opinion of men whose judgment upon this subject is matured by repeated experience, authorizes the assertion that the durability of any particular species of wood is not so much connected with the nature of it, as with its seasoning. Hemlock spruce, (*Pinus Abies Americana*) is a very perishable wood, if used when recently felled and sawed; but it is a fact, that young hemlock, free from wind shakes, duly seasoned, and not floated, will last as long as most other kinds of wood under similar circumstances. Mr. D. Evans, jun. of Philadelphia, an experienced builder, in altering his house, found a bond piece of hemlock sound, which he knew from the age of the house must have been at least 80 years old.

The Senate chamber in Congress hall; and the building erected for the President of the United States, and now occupied by the University of Pennsylvania, were striking instances of the perishable nature of unseasoned hemlock: but it is also a fact, that white-oak if unseasoned, will not last longer than hemlock when put into brick or stone-work. Of this many facts may be produced. The necessity of attention to the timber is the more earnestly enforced, because from the rapidity with which houses have been built in Philadelphia for some years past, much timber, fresh from the saw-mill, has been put in dwellings intended by the owners to be durable, but which have already begun to decay, and will continue to rot. Rome serious acidents will one day occur, to rouse people from their inattention.

2. The thickness of the walls of a house is an object nearly of equal importance, with that of the

first article. Independently of the increased durability of a house, arising from thick walls, the consideration of our comfort ought to excite to improvement in that particular. Houses with thick walls are cooler in summer and warmer in winter. In Calcutta the walls of houses are nearly three feet thick, and the outsides are covered with a mortar called *Chunam*, (see Cement) which reflects the heat, so that they are rendered cooler than many houses in the United States, notwithstanding the greater heat of the climate of India. In winter also, the quantity of fuel saved by the thick walls of a house confining the heat, must be obvious. At present the walls of most houses built in Philadelphia are much too thin, as they seldom exceed nine inches, and derive the chief part of their support from the adjoining houses. It is not unusual to perceive day-light thro' the walls of the garret of a house, a circumstance which must necessarily render these apartments uncomfortable at all seasons; but there is another disadvantage which ought to be mentioned: should the house take fire and the rafters of the roof be destroyed, the gable end, for want of support will probably fall in, and endanger the lives of those who meritoriously risk their safety for our benefit. Such an accident happened in a large brick house last spring, (1803) and occasioned the death of one person, and seriously wounded some others.

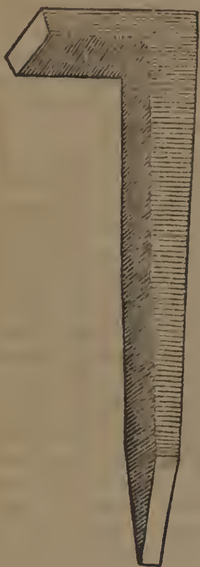
Count Rumford has clearly proved, that "though the individual particles of air, can receive heat from other bodies, or communicate it to them, yet there is no communication of heat *between* one *particle* of *air*, and *another particle* of *air*. And hence it follows, that though air may, and certainly does carry off heat, and *transport* it from one place, or from one body to another, yet a mass of air, with all its particles at rest, could it remain in that state, would be totally impervious to heat; or in other words, such a mass of air would be a perfect non-conductor.

"Now if heat passes in a mass of air merely in consequence of the motion it occasions in that air, it is clear that whatever can obstruct and impede the internal motion of the air, must tend to diminish its conducting power. I found that a certain quantity of heat which was able to make its way through a wall, or rather a sheet of confined air $\frac{1}{2}$ an inch thick in $9\frac{3}{5}$ minutes, required $21\frac{2}{5}$ minutes to make its way through the same wall, when the internal motion of the air was impeded by mixing with it $\frac{1}{56}$ part of its bulk of eider down, of very fine fur, or of fine silk, as spun by the worm."

Hence probably, if a room were lined with canvass nailed on battens two or three inches thick, and the space filled up with rabbit-fur, cotton, feathers or wool, very great advantages would be derived in respect to saving the heat. On the north-west and north-east sides of an exposed house, the experiment might at least be tried.

If fur be wanting, the same end may be nearly as well answered by the following plan. Place battens from one and a half. to two inches thick, at proper distances against the wall, and the height of the room, and secure them by stay-

nails driven in between the joints. Upon the battens lay the laths. The stay-nails may be of the following form.



Thus by confining a column of air between the wall and the laths, the air of the room is less affected by the diminution or increase of heat in the external atmosphere; and the dampness which so commonly penetrates walls, to the injury of paper, pictures and furniture, is effectually prevented..... It is a common practice to work blocks of wood into the walls, and to fasten battens to them for the purpose of lathing, but Mr. EVANS, (before-mentioned) assured the editor, that some walls thus treated, have been thrown several inches out of plumb, in consequence of the expansion of the blocks.

3. Cedar or cypres shingles are generally employed in the United States for covering houses: the danger arising from their combustible nature, is obvious, and the effects of this combustibility have been frequently felt. Houses, distant from a scene of conflagration, have been often set on fire in consequence of sparks and burning flakes being carried to the roofs by the wind. New-York indeed is an exception to the general passion for shingling. There, tiles have been used for many years; and, lately, from the fortunate discovery of a slate quarry in that state, this superior substitute is coming rapidly into use. The expense of a slate roof is but little more than a roof of shingles, and will last for ever; whereas a shingle roof must be repaired every twenty or thirty years.

4. *Stone cornices* are of great utility in preventing the progress of fires. Where a row of houses is continued for some hundred feet, their utility must be particularly obvious in interrupting flames.

A battlement, (parapet) and stone bracket in the cornice, (if of wood) would also answer the same purpose. There were formerly in use in Philadelphia, but have been abandoned in latter times.

5. Chimneys should uniformly be built in with the wall against which they are intended to run up; and when a chimney is carried up in a brick or stone house, not originally intended for a fire place, it should be clamped with irons, and pinned on the outside of the wall; otherwise in case of fire, the chimney will fall, when the trimming joices on which it rests are burnt, and endanger the lives of those who may be meritoriously exerting themselves to save our property. Such an accident, and from the very neglect, against which the

reader is now cautioned, happened lately at a fire in Water-street, Philadelphia; where by the falling of a chimney, society and their families were deprived of some very valuable citizens.

6. The wind from the north-east in the United States being cold, and generally moist; and the north-west wind, though dry, being also cold; a house should be so contrived if possible, as to occupy the above quarters with entries and stair-cases.

7. Count Rumford has taken notice of the benefits that are derived in cold countries from the use of double windows, (that is, one paned window near the outer surface, and another near the inner surface of the wall in each casement, with a vacant space between them) for a defence from the cold in high latitudes; and he wonders that it never should have occurred to any one, that double windows would be equally beneficial in keeping out the heat as well as cold, but to render this contrivance as beneficial for the purpose of cooling houses, we must add the following caution of Count Rumford. "When double windows are used in hot countries, to keep dwelling houses cool, great care must be taken to screen those windows from the sun's direct rays, and even from the strong light of day; otherwise they will produce effects directly contrary to those intended. This may be easily done, either by Venetian blinds or by awnings. In all cases where rooms are to be kept cool in hot weather, the less light that is permitted to enter them, the cooler they will be."

Dr. Anderson (*Recreations*, vol. 1.) has suggested an improvement in the construction of double windows, but of a questionable nature.

8. The utility of stone staircases was mentioned under the article "Fire." See also Staircase.

9. In this climate, no house should be erected without a conductor of lightning. The preferable mode of securing a house from this awful agent, is described under the article "Conductor."

10. Where shingles are used to cover roofs, the courses ought to be regulated by the following rules: When cedar shingles are used, they may be laid in courses of nine or ten inches; but when short cypres shingles are employed, the courses may be seven inches. In both cases, they will be but three shingles thick, which is a point to be aimed at. Such a roof will dry sooner than when thicker, and will not be so likely to leak as when thinner.

An honest carpenter of note in Philadelphia, made his courses very short with the express intention of preventing the decay of the roof; but it was generally remarked that houses which had been shingled by him, required new roofs sooner than others which had been roofed by other carpenters. Some very old houses in Philadelphia, the roofs of which have not been renewed for many years, have their courses of shingles longer than more modern houses. Shingles are of late bevelled at their butt-ends, to permit an easy passage to rain, which by dropping from the abrupt thick end of the shingle, has been found to wear the roof; the bevelling however should be done before the shingles are taken up to the roof; for, if afterwards done by a hatchet: the part intended to be pared

will be missed by that instrument, which will penetrate the shingles already laid on, thus making numerous cavities for the reception of rain, and cause a rapid decay of the roof. An instance occurs in Philadelphia, of three adjoining houses, on one of which the shingles from being bevelled *on the roof*, leaks; while on the other two, they were put on as they came from the yard, and do not admit a particle of water. Shingles if dipped in fish oil, will have their durability greatly increased.

In South Carolina and Georgia, houses are built of a composition called *tabby*, which is ornamental, and very durable. It is made in the following manner.

Oyster shells (of which immense banks are found in those states,) are burnt to lime, and mortar made, into which are incorporated as many small dead shells as it will contain: this semi-fluid mass is then poured into frames of the size of the intended walls, and well pounded; when dry, the frame is raised, fresh tabby poured in, and again pounded: in this way the walls are built, and in a short time they become as hard as stone; and, being white, are particularly well calculated to reflect the intense rays of the sun.

MUD-HOUSES. "The way of building mud-houses, and walls for fencing, in several parts of England, is as follows. They take any kind of soil of a loamy or clayey nature; but such as has been tempered in the bye-ways by cattle and horses is preferred: this is laid in a ring or circle, if there be sufficient room, and thereon a quantity of coarse hay or cut straw about four inches long is laid, and upon that another coat of soil, and then oxen or horses (the former being preferred) are driven round over it as in threshing, and when sufficiently mixed by being thus trodden; and occasionally forked up, it is fit to begin the building with. A foundation of stone, about 12 inches above ground being first laid, a man takes a three pronged fork, whose prongs are flatted; and with it builds a wall of this tempered earth about 18 inches thick, and according as the weather is, sometimes two and sometimes three feet high, taking care to pack it as closely as possible. It is now left to become sufficiently dry to bear another layer of 2 or 3 feet high upon it. The operation is thus continued until the desired height is obtained. If it be a house of more than a single story, a curb frame of light scantling may be thrown round, and buried in the next layer, upon which also the ends of the beams may be laid.

When these walls are for fencing orchards, gardens, &c. the top is capped with a thatch of stubble, covered in the centre with a light layer of mud; and when for houses, the roofs are generally thatched with straw, and without any covering to the outsides of lime or plaster. These walls have been known to stand upwards of a century.

The advantage of building in this way, over the *pisé* building used in France, is peculiar to those countries where labour is high, because very little art is necessary; the commonest labourer being competent to the task; and there being very few situations that doth not admit of soils proper for the work; moreover it is not necessary to have the mud freed from small stones; whereas in the *pisé* buildings a considerable portion of art is practised in erecting the frames

and in beating the work all over equally hard.

For small dwellings, stables, sheds, fences, ice-houses or other out offices, this is the cheapest and best mode that I know of; neither cold nor heat can penetrate these walls, and if plastered on the outside, and painted or lime-washed, they would appear as elegant as any common stone house, and very far superior to brick.

The advocates for *pisé* building complain, but without reason, of the use of straw or hay in the above described buildings, but the author of this article has known villages where almost every house was of this kind, and never remembered any inconvenience to arise from the supposed decay of that article: indeed the quantity is too small, and the soils when tempered properly and well packed on with the fork, will not admit of air, nor derive injury, from the partial and very imperceptible decay of the hay or straw therein."

For the above account of the mode of making mud-walls, the editor is indebted to S. W. Johnson, esquire, of New-Brunswick, New-Jersey.]

HOUSE-LEEK, or *Sempervivum*, L. a genus of perennial plants, consisting of 13 species, one of which, the *Sempervivum tectorum*, Common House-leek, or Cyphel, is a native of Britain; it grows on the roofs of houses and old walls, where it flowers in the month of July.

This plant is eaten by sheep and goats: its juice, when mixed with honey, is said to be of considerable service in aphthous cases, or the thrush of children; it also affords immediate relief, whether applied by itself or mixed with cream, in burns and other external inflammations.

HOVEN, or *blown Cattle*. See [art. CATTLE.]

HUNGER, and uneasy sensation, occasioned by long abstinence from food, when the body is in a state of perfect health.

Without attempting to specify the different preparations used by the ancients, for the *prevention* of hunger, we shall merely communicate such substitutes as have been judiciously recommended on sudden emergencies; together with the most proper means of administering food to persons who have for a considerable time been deprived of aliment.

In times of distress, life may be protracted with less pain and misery, by a moderate allowance of water; because that fluid counteracts the acrimony and putrid tendency of the humours, while it furnishes the lungs with the degree of moisture essentially requisite to the performance of their functions. It is, however, a matter of serious consequence to such as are exposed to this dreadful calamity, to be provided with the means of alleviating its horrors, when about to undertake a long journey, in which they are apprehensive of a scarcity of provisions.

The American Indians are supposed to use a preparation consisting of the juice of tobacco, and the shells of oysters, snails, or cockles, burnt so as to be reduced to the finest powder. These ingredients are dried, and formed into lozenges of a proper size to be held betwen the gum and the lip, so that, being gradually dissolved, they obtund or mitigate the sensations both of hunger and thirst.

A more palatable and efficacious

substitute for food, however, in a famishing situation at sea, is the powder of *salep*, which has been judiciously suggested by Dr. LIND, in order that it may form part of the provisions of every ship's company. This powder, together with *portable soup*, when dissolved in boiling water, forms a rich thick jelly, and *one* ounce of each article will furnish a whole day's subsistance for an adult. Indeed, from the experiments made on salep, by Dr. PERCIVAL, it appears to contain a larger quantity of nutritious aliment, in proportion to its bulk, than any other vegetable matter hitherto known as food. It also possesses the valuable property of suppressing the nauseous taste of salt water; and may thus be of great utility at sea, when fresh water is either wholly, or so far consumed, that the mariners are "put upon short allowance." From the same mucilaginous property, it greatly tends to counteract the acrimony of both salted and tainted meat. When provisions are nearly exhausted, the most beneficial method of using salep in distressing circumstances will be, to mix it with an equal quantity of beef-suet, and form the whole into little balls. By swallowing this composition, at proper intervals, the coats of the stomach will be defended from irritation: and, these balls, like other oily and mucilaginous matters, being highly nutritive, and slowly digested, small portions are well calculated to support life, and thus to form an efficacious preservative against the most dreadful calamity that can possibly happen to mankind. Gum arabic is likewise a good substitute for, or addition to, salep, in the preparation above mentioned; and as it renders the whole mass more solid, it will require a degree of mastication, by which the saliva is separated and conveyed into the stomach; while it contributes to assuage the pains, both of hunger and of thirst.

In attempting the restoration of those unfortunate persons who have indured the horrors of famine, we recommend the utmost precaution. Warmth, cordials, and the most nourishing broths, or jellies, are to be administered gradually, and with great circumspection; for otherwise, evnn these might prove fatal. The most judicious mode of communicating warmth to the exhausted patient, will be to place a healthy person on each side in contact with him. Bathing the feet in warm water, and fomentations, may be advantageously employed; but their temperature ought to be lower than that of the human body, and imperceptibly increased. New milk, weak broth, or water-gruel, may be used for both purposes, as well as in repeated clysters; because nourishment may, in this manner, be effectually conveyed into the body by different passages, which are most pervious during a state of long abstinence; provided the means of relief have not been too long delayed. Cordials should at first be given in very small doses, and much diluted: one of the best preparations is white-wine whey, which affords, both a gentle stimulus and easy nutriment. When the patient's stomach acquires a little strength, a new-laid egg may be mixed with the whey, or given in some other form that may be more agreeable to his pa-

late. Thus, he may progressively return to a more substantial diet; so that, by proper care and cheerful society, he will in a short time be restored to health.

HUNTING, the exercise, or diversion of pursuing wild quadrupeds, whether those of game or prey.

Hunting has at all times been a favourite amusement, as well among the rudest, as the most polished nations. Much, however, has been said both for and against the continuance of this practice. The late FREDERIC the Great, of Prussia, never joined in the chace. Where wild, or noxious animals abound, or where the object of hunting is to procure the necessary supply of food, the chace is doubtless justifiable. But, when it is attended with such mischief as is often the case in highly cultivated districts, we conceive, it ought to be gradually abolished. Nor should it be urged by professional sportsmen, that, without being chased, wild animals would multiply in such numbers as to become dangerous to man and cattle. This plea, however specious, is not conclusive; because we are in possession of various methods by which animals of prey might be entrapped, taken or otherwise exterminated, without any danger or inconvenience to the huntsmen. But, while this amusement is restained within due bounds, and not carried to such extremes as are, or at least were, till lately, practised in France and Germany, we hesitate to pronounce unqualified censure; especially as it frequently contributes to the health and vivacity of its votaries.

HURTLE-BERRIES. See BILBERRIES.

HUSBANDRY, strictly speaking, comprehends the whole business of a farmer, or a man who maintains himself and family by cultivating the earth.

In this light, husbandry includes not only agriculture, but several other branches connected with it. Of this description are the rearing of cattle; the management of the dairy, or the making of butter and cheese; the treatment of bees; the raising of flax, timber, hops &c. To these may be added horticulture, as far as it respects orchards, and the making of cyder and perry; the domestic economy of the farm-house, and various other objects, of which we treat in their respective order of the alphabet.

Such are the numerous branches which demand the husbandman's attention; and so complicated indeed are they, as to call forth every exertion and ingenuity, for the purpose of facilitating the different operations, and to promote their more or less important objects. Hence various societies, both public and private, have been instituted; which, by judicious premiums, and other modes of encouragement, have advanced this interesting science perhaps to the highest degree of perfection of which it is susceptible, if the occasional difference of opinion were ultimately settled. We shall therefore, subjoin a list of such works as will amply repay the time and attention which may be spent in pursuing them, and which reflect lustre and credit on the country in which they have been published.

The *Communications to the Board*

of Agriculture, and the *Transactions of the Society for the Encouragement of Arts, &c.* possess the first place in the scale of merit. With these may also be classed the *Letters and Papers of the Bath and West of England Society* and Mr. YOUNG's *Annals of Agriculture;* works which have been carried on for a series years, and which progressively become more interesting and useful.

Beside these collective and national works, there have lately appeared various detached treatises, relative to the principal branches of husbandry, the perusal of which cannot fail to be attended with considerable advantage. Among these are, 1. Lord SOMERVILLE's *System followed, during the two last Years, by the Board of Ariculture, &c.* (8vo. pp. 300, 2d edit. Miller, 1800); a work replete with information and philanthropic proposals. 2. Dr. ANDERSON's *Essays on Agriculture* (8vo. 3 vols. 1*l*. 7*s*.) 3. The same practical writer's *Recreations in Agriculture*, of which five volumes have been already published, 4. Mr. ELLIS's *Husbandry abridged and methodized*, (8vo. 2 vols. 10*s*. 6*d*.), 5. Mr. HARTE's *Essays on husbandry* (8vo. 5*s*. 6*d*.) 6. Mr. PARKINSON's *Experienced Farmer* (2 vols. 8vo. Robinsons, 1798); a work containing a variety of useful hints and directions. Much valuable information may also be collected from the *New farmer's Calender* (8vo. p. 619. 9*s*. Symonds, 1800); and likewise from Mr. BANISTER's *Synopsis of Husbandry* (8vo. p. 471. 7*s*. Robinsons, 1799,) which last mentioned work is obviously written by a man of experience.

[To the above may be added a recent English publication entitled "*Gleanings on Husbandry* &c." reprinted by HUMPHREYS, Philadelphia, 8vo. and of American works BORDLEY's *Essays on Husbandry*, DEANE's *New-England Farmer. Transactions of the Massachusetts and Connecticut Societies of Agriculture* deserve to be mentioned.]

HYACINTH, *Hyacinthus*, L. a genus of perennial plants, comprising 16 species, one of which is indigenous; namely, the *nonscriptus*, English Haycinth, or Harebell Hayacinth (*Scilla nutans*, or Wild Hyacinth of Dr. SMITH:) it grows in woods and hedges, where it flowers in the month of May. The fresh roots of this plant are poisonous; but it appears from experiments, that they may be advantageously converted into *starch*.

The most admired of the exotic species is the *Orientalis*, or Eastern Hyacinth, which is cultivated to a great extent, and with success, by the florists of Holland, whence it has been lately imported. It is one of the most odoriferous flowers, and has several hundred varieties, the price of which is from three-pence to 20*l*. or 30*l*. per root!

The hyacinth is a hardy plant, and will prosper in any soil, though the more delicate varieties require to be sheltered during the severity of winter. They may be propagated either from the seed, or by planting off sets from the roots, in autumn; in which latter case the bulbs ought to be previously cleaned and dried.

[HYDRASTIS CANADENSIS, CANADIAN yellow dye.

The root is composed of thick fleshy tubers, of a deep yellow co-

lour within, but covered by a brown skin. The fruit is red and succulent; it delights in shade and moisture; flowers in May and June.... The Indians dye a fine yellow colour with the root.]

Hydrocephalus. See Water *in the head*.

HYDROMETER, an useful instrument for measuring the gravity, density, strength, &c. of spirits, or other liquids.

For this purpose, various hydrometers have been contrived on different principles; but the most simple of which appears to be that devised by Mr. William Jones, mathematical instrument-maker, Holborn. It requires only *three* weights to discover the strength of spirits, from alkohol down to water, and is adjusted to the temperate state of the air, or to 60° of Fahrenheit's thermometer. Farther, as an alteration of this temperature has a very material effect on the gravity of spirits, by causing them to appear much stronger during warm weather, and the reverse in cold seasons, it was formerly requisite to place a thermometer in the spirits previously to immersing the hydrometer, and to make a certain, but inaccurate, allowance for the several degrees the mercury may be above or below, the temperature before mentioned. In order to remedy this inconvenience, Mr. Jones has contrived to unite the thermometer with his instrument; and, from experiment, to adapt the divisions to the different degrees above or below the temperate state. Thus, his hydrometer is rendered easy in its application, and sufficiently accurate for the common purposes of distillers, or dealers in spirits.

[The hydrometer of Baume is universally used in France; but in England it is never employed..... Mr. Jones' contrivance abovementioned, supercedes any other.]

Hydrophobia. See Bite *of a Mad dog*.

HYKES, a species of blankets, commonly used by the inhabitants of Barbary. They consist of a light woollen cloth, woven by women, who conduct every thread with their fingers, and without the aid of a shuttle. This manufacture appears to be a coarse kind of shawl, and is the more remarkable, as each of such hykes is from five to six yards in length, and breadth: it forms the whole apparel of the wretched natives, and serves them as a covering for their beds during the night.

[HYPERICUM, *Saint John's Wort*. A genus of plants including a great many species. Professor Martyn, in his late edition of Miller's *Gardener's Dictionary*, enumerates 7 species, natives of the United States. It is to be sincerely regretted that this destructive plant is found on any part of our soil. Probably the farmer has not a greater enemy to contend with, the wheat fly excepted. Mr. Peters says, he "knows none in the pestiferous catalogue so exhausting and destructive as the St. John's wort. Besides being injurious to cattle and other stock, it is the greatest enemy the clover husbandry has to contend with. It grows from roots, slips and seed, and so difficult is it to eradicate, that though two well attended crops of Indian corn (zea mayz) may conquer the old stock of this weed, a new growth will spring up from the seeds which had dropped and remained in the earth." Mr. P. destroyed this new growth by turning

up the roots, by shallow ploughing to the frost of a severe winter.... Those who have not been visited by this scourge, should be watchful to eradicate it at any expense or labour, on its first approaches. A small degree of expense and attention will then *prevent*, what it is extremely difficult to *remedy*, when it has gained full possession of their fields.

Dr. WILLICH says, art. *St. John's Wort*. That the *Hypericum Perforatum*, or Perforate St. John's Wort, is eaten by goats, though refused by horses and hogs. The leaves are said to destroy worms, and the semi-pellucid dots found on them, yield on distillation, an essential oil. In Sweden, the flowers are used to impart a purple tinge to spirits, and the whole plant, when dried and boiled in alum water, communicates yellow or brown red shades to yarn. The seed, bearing tops, contain a fine red colour, that appears on friction between the fingers; and, more than any other vegetable, resembles Gum-lac.]

HYPOCHONDRIAC AFFECTION, or *Hypochondriasis*, may be defined to consist in a corrupted state of the stomach and intestines, accompanied with languor, dejection of mind, and fear arising from insufficient reason, in persons of a melancholy disposition.

Among the numerous causes contributing to generate this tormenting affection, the most frequent are, acrimony of the bile; plethora; a preternatural viscidity, or stagnation of the blood; and suppressions of the customary evacuations. To these may be added an hereditary disposition; too free indulgence in wine; repelled eruptions; violent passions of the mind, &c.

Few persons of a sedentary life are entirely free from this complaint; which, if neglected, is more troublesome than dangerous; but if it be improperly treated, it may occasion various diseases of a more fatal tendency, such as melancholy, jaundice, palsy, apoplexy, &c.

The cure or removal of hypochondriasis must be attempted by those medicines which are calculated to counteract occasional causes, and obviate the more urgent symptoms: hence gentle laxatives, acidulated and chalybeate water, as also copious draughts of cold water, have often been productive of the best effects. Emollients, diluents, the cold-bath, Peruvian bark, and exercise, especially riding on horseback, if judiciously resorted to, have all been found of service.

Hypochondriac patients ought never to fast long; their diet should be solid and nourishing: they ought carefully to avoid all acescent and flatulent vegetables. One of their principal objects, however, ought to be that of preserving the mind constantly in a cheerful and serene state. Nor should they neglect to rub, if possible, the whole body, every morning and evening, for ten minutes, or longer, with coarse flannel cloths.....Where the patient's circumstances can support the expense, a voyage to a warmer climate will be of greater advantage than medicines; though a rigorous adherence to a proper diet and regimen, at home, may also restore his health, and more certainly than luxury and dissipation abroad.

HYSSOP, or *Hyssopus*, L. a

genus of exotic plants, comprising three species, the principal of which is the *officinalis*, or Common Hyssop. It grows to the height of 18 inches; is a very hardy plant, and may be propagated either by slips or cuttings, or by seeds. The leaves have an aromatic smell, and a warm pungent taste: they are particularly recommended in humoural asthmas, coughs, and other disorders of the breast and lungs; being supposed powerfully to promote expectoration. According to RAY, these leaves are of great service when applied in cataplasms to bruises, the pain of which they speedily mitigate, and at the same time disperse every mark, or spot, from the part affected.

HYSTERICS, a spasmodic or convulsive disease, to which females chiefly are subject. It attacks them at uncertain intervals, and is usually preceded by a langour and debility of the whole frame. There is a violent pain in the head; the eyes become dim, and shed involuntary tears; a sensation is felt similar to that of a globe rising from the lower part of the abdomen to the stomach; and, at length, it reaches the throat, where it produces a sense of suffocation, a difficulty both of breathing and swallowing, while it is accompanied with great pains in the lower belly.

The general cause of hysterics is supposed to consist in too great a degree of mobility and irritability of the nervous system: whatever tends to enervate the body, may induce this complaint. Such are excessive heat, cold, terror, fear, grief, rage, acrid humours, ill smells, scorbutic affections, and glandular obstructions. Hence it chiefly attacks females of weak, relaxed habits, though a few instances have occurred, in which men have also been affected.

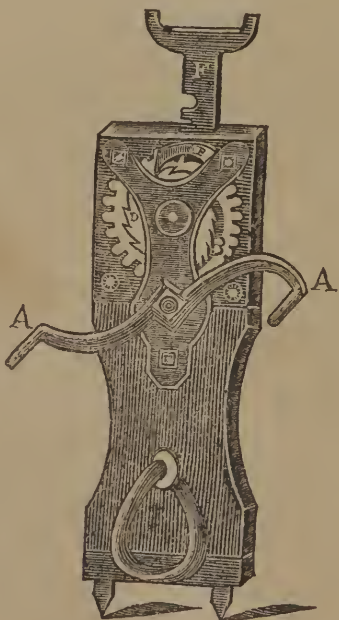
Notwithstanding the very alarming nature of this disorder, it seldom terminates fatally, unless from erroneous treatment. It, however, admits only of palliation, as it has but in few instances been completely removed. The chief object is to counteract or prevent the peculiar convulsive affection which immediately precedes the attack. And though we are in possession of a remedy, sufficiently powerful to effect that desirable purpose, yet great circumspection is required in its use; as, otherwise, the consequences might be more distressing than the disease. This medicine is *laudanum;* which, judiciously administered, checks the most violent paroxysms for a considerable time, but cannot accomplish a cure. Hence asa-fœtida may be given with greater advantage, though it disagrees with some persons, and occasions pain in the stomach and vomiting. Ipecacuanha, taken frequently in small doses, has sometimes been attended with success. To these may be added electricity, Peruvian bark, fetid matters presented to the organ of smell, such as burning feathers, or the smoke of sulphur, and the application of æther, strong volatile alkali, or other pungent matters to the nostrils. Relief has also been obtained by the sudden affusion of cold water on the face and hands, but more frequently from the application of warm water, especially to the feet and legs. In order to effect a radical cure, it will be requisite to resort to the chalybeates, mineral waters, or other tonics, and especially to the cold bath,

where the constitution can support it. The diet of hysteric patients ought to be light and nourishing; they should carefully avoid whatever tends to relax the bowels or debilitate the system. Gentle exercise, and cheerful society, ought by no means to be neglected.... Thus, by proper attention, this painful malady may possibly in the course of time be removed; or at least so far palliated, that its attacks will be less frequent and violent.

I. and J.

JACK, a well-known machine for raising timber, or other ponderous bodies.

Although numerous accidents almost daily happen in using the common jacks, for want of a contrivance to prevent the machine from taking a retrogade course, if the weight should, from any circumstance, overbalance the power, no attempts have till lately been made, to protect the workmen on such occasions. In order, therefore, to supply this deficiency in mechanics, as far as our opportunities will admit, we offer the annexed cut to the consideration of those readers who are not yet acquainted with the improvement it represents.



This machine was, in the year 1794, presented to the Society for the Encouragement of Arts, &c. by Mr. Mocock, of Southwark, for which he was rewarded with a premium of 20 guineas.

Description of the Cut of Mr Mocock's *Improved Machine for raising large weights.*

A A, are the double handles of the winch.

B, represents the large toothed wheel, in which the pinion on the axis C works.

D, a ratchet-wheel.

E, the click, or pall, which falls into the teeth of the ratchet, and thus prevents the machine from running back in case the weight should at any time overcome the power.

F, the rack, as appears in jacks of the common construction.

From a comparison of Mr Mocock's jack with those in common use, the former differs from the latter only in one respect; namely, that, in the improved machine, a pall, or click, and ratchet, are applied in such a manner as to stop the machine in the case above mentioned, and thus to prevent those melancholy accidents which frequently occur, especially on board of ships engaged in action; when, from inattention, or neglect in fixing the hooks, or from any other cause, the common jacks fail; and, as the difference in the mechanism is not material, the improvement may be easily applied to the instruments already manufactured.

Jack-by-the-hedge, See Garlic Hedge Mustard.

JACK-DAW, or *Corvus monedula*, L. a notorious bird, that is a native of Britain. It breeds in steeples, old castles, and on lofty rocks, where the females deposit five or six eggs.

The jack-daw is a gregarious bird, feeding on insects, seeds, and grain. It is equally mischievous in the fields as well as in the gardens, and is so prone to stealing, that it carries away more than is necessary for its subsistence. Hence various methods have been contrived for taking this depredator: one of the most effectual is that practiced in some parts of England, and which is so ingenious, that it deserves to be more generally known.

A stake, about five feet long, is first driven firmly into the ground; the upper point is previously made so sharp that no bird can possibly settle on it. Within a foot of the top is bored a hole, three quarters of an inch in diameter, through which a stick is put, about eight inches in length. A horse-hair noose is next fixed to a thin wand made of hazel, which is passed through the hole: the remainder being left open beneath the transverse stick. The other end of the hazel rod is then introduced into another hole in the stake near the ground, where it is fastened. The stake should now be placed in a situation which is frequented by the bird in quest of food, when he will consequently be induced to alight on it; but, on finding the point too sharp, he will probably settle on the little transverse stick: as this sinks with his weight, his leg will be effectually secured in the noose.

JALAP, in medicine, the root of the *Convolvulus Jalappa*, L. an exotic species of bindweed.

This root is imported in transverse slices from Xalapa, in South America. The best pieces are compact, hardy, weighty, of a dark colour, and have black striated circles. It is frequently mixed with slices of bryony-root, which, however, may be easily distinguished by their paler colour and porous texture.

Jalap possesses no smell, and leaves very little taste upon the tongue; but, when swallowed, it affects the throat with a sense of heat, and occasions a plentiful discharge of saliva. It is advantageously employed in various disorders, but chiefly as a purgative; for which purpose from 15 to 30 grains, and upwards, are taken in powder: its action, in general, is mild, without causing nausea, or gripes, except in hot bilious habits, and hypochondriacal cases: nor should it be indiscriminately given to children or young persons, whose bowels it relaxes, and at length destroys the appetite.

JAMES'S POWDERS. See FEVER-POWDERS.

JAPANNING, the art of varnishing and drawing figures on wood, in the manner practised by the inhabitants of Japan, and other parts of India. It may be applied to almost every substance that is dry and rigid; such as leather, metals, and even paper, previously adapted to the purpose.

If wood or metals, are to be japanned, it is sufficient that their surface be smooth and clean; but leather requires to be carefully strained on frames, to prevent it from cracking, and consequently parting with the coats of varnish. Paper is managed in a similar manner, and is generally coated over with some kind of *size*. The Japan is then laid on; but as this art is in the hands of extensive manufacturers, and is, besides too expensive to be practised for amusement, we shall only mention a patent which was lately granted to Mr. JOSEPH EYRE, of Sheffield, for a method of impressing japan upon the ornamented handles of knives, and other articles....His process is very simple: as soon as the pattern is impressed on the handles, &c. it is taken out of the press (being previously marked, so that it may be replaced in the same situation,) and the japan laid on. The press is then heated to a certain degree and the japanned article returned to it; by which means the varnish is pressed in, rendered more firm, and made capable of receiving a high polish. This method is applicable to ornamental handles of knives, forks, &c. made of wood or paper, in imitation of carved horn, or bone....See VARNISH.

JASMINE, or JESSAMINE-TREE, *Jasminum*, L. a beautiful exotic plant, consisting of nine species, three of which are reared in England, &c.

1. The *officinale*, or Common White Jasmine, with shrubby, slender, long stalks and branches, which grow, when supported, to the height of 15 or 20 feet: it has numerous white flowers, that blow at the extremities or points, and emit a very agreeable odour, especially in the evening. The Italians prepare a fragrant oil from these flowers, by the following easy process: Cotton-wool is previously soaked in bonduc-oil (*Oleum Behen*), which possesses no flavour whatever; a thin layer of such cotton is then placed in a glass vessel, and a stratum of flowers over it; another parcel of cotton is spread over the latter, and this alternate stratification repeated every day, till the oil is completely saturated with the grateful odour of jessamine; when the whole is carefully expressed. It is worthy of notice, that neither spirits nor water will combine with this favourite perfume; and that there is no other method of fixing it than by means of vegetable oils.

2. The *fruticans*, or Shrubby Jasmine, which has long shrubby trailing stalks and branches, on the sides and ends of which appear yellow flowers in the month of June. This species is remarkable for the numerous suckers which spring from its roots, and overspread the adjoining ground, if they be not annually taken up: its branches and leaves impart a fine citron colour to cloth previously immersed in alum-water: but solutions of tin and bismuth produce a much brighter shade.

3. The *humile*, or Dwarf Yellow Jasmine, has firm stalks, low bushy branches, and produces yellow flowers in the month of July. The whole plant yields a fine olive colour, if the wool or cloth be first prepared in a solution of green vitriol.

All these species thrive in our gardens, and are easily propagated by layers and cuttings; but they require a warm, and rather humid, soil. Beautiful shrubs may be produced, by inoculating the first species with that called *grandiflorum*, or the Great-flowered Catalonian Jasmine.

JAUNDICE, or *Icterus*, a disease in which the skin and eyes are yellow: the feces of a whitish colour; and the urine of a dark red hue, tinging cloth or other substances immersed in it, of a yellowish shade.

Various causes produce this obstinate disease; such as a very diluted and acrid state of the bile; indurated swellings of the intestines; the colic, when occasioned by eating unripe fruit; accumulations of humours near the liver; suppression of the natural evacuations, &c. It may also arise from coarse and unwholesome food; as well as from the effects of fear, terror, anger, or any other passion; and likewise from suddenly drinking cold water, while the body is overheated.

Persons of a sedentary life and sanguine temperament, especially females, are liable to be attacked by the jaundice. Even infants become subject to the disease, if the breast be given them, while the mother is under the influence of passion.

The chief object, in curing the jaundice, is to remove the cause which occasions the accumulations of bile and humours at the liver; but, as it is very difficult to ascertain the precise nature and operation of that cause, various means ought to be employed, as circumstances may require. If, however, the jaundice arise from indurated swellings in the viscera, it is seldom curable; yet, as this symptom cannot always be discovered, the most judicious method will be that of treating the disorder conformably to the manner practised in calculous affections, or the stone; with a view to dissolve the concretions, and to prevent their future accumulation. For this purpose, gentle emetics should be frequently taken, and constant exercise on horseback; which from their concussion of the viscera, dislodge the obstructing matter, and thus remove the complaint. But, if there be any tendency to inflammation, the patient ought to lose a little blood, previously to taking any emetics. Should, however, no relief be obtained after two or three vomits have been administered, it will be advisable to delay the repetition.

Honey, antiscorbutics, aromatics, bitters, blisters applied to the regions of the liver, have all been

found serviceable in the cure of the jaundice. But, if these remedies fail, as in cases of scirrhous and glandular concretions, recourse can only be had to such medicines as may palliate the symptoms. Of this nature are *diuretics* (which see); though, if the pain or irritation of the skin be violent, opiates must be resorted to; and, if the blood has a tendency to dissolution, it must be counteracted by proper antiseptics, conjoined with the internal use of sal ammoniac. When the disorder was suspected to arise from a rheumatic cause, Dr. SELLE successfully prescribed the sulphurated oil of turpentine, in combination with vitriolic æther; a powerful medicine, which has even expelled biliary concretions. Should it, however, (as often happens), spontaneously disappear, it will be advisable to prevent its return, by a course of tonic remedies, and especially the Peruvian bark. The water of [Bristol, Pennsylvania,] will also be found very serviceable; and, if the patient have no opportunity of bathing in it, affusions of common water may, according to Dr. SIMS, be advantageously substituted.

The diet of persons affected with the jaundice, ought to be light, cool, and diluent; consisting chiefly of ripe fruits and mild vegetables; many have been effectually cured by living for several days on *raw eggs* alone. Butter-milk, whey sweetened with honey, or decoctions of marsh-mallow roots, and other aperient vegetables, ought to constitute the whole of their drink. Gentle and daily exercise in the open air ought by no means to be neglected; while the mind should be kept serene and cheerful.

JAUNDICE, in *horses*, a disorder which is by farriers usually called the *yellows*. It is divided into two species, the *yellow* and the *black*. In the former kind, the whites of the animal's eyes assume a yellowish cast; his tongue and his lips also partake of the same colour, though in a slighter degree. In the *black* jaundice, those parts are tinged with a blackish hue. The remedy commonly administered for the cure of this malady, consists of one ounce of *mithridate*, (which see) dissolved in two quarts of strong beer, and given warm to the animal affected, once in twelve hours: by continuing these draughts for a few days, the distemper generally disappears.

The *jaundice* also attacks *sheep*, and imparts a yellowish cast to their skins. It may be cured, according to Prof. BRADLEY, by giving them internally some stale human urine, at frequent intervals.

JAW, or JAW-BONE, in anatomy, is the bone which contains the teeth within their sockets.

The jaw is liable to a variety of disorders, occasioned by colds or other accidents: the most fatal are, 1. The dislocated and fractured jaw, the treatment of which, being merely chirurgical, is foreign to our purpose; and, 2. the LOCKED JAW, or *Trismus traumaticus*, which is a spasmodic rigidity chiefly of the under jaw.

This alarming complaint attacks persons of all ages, and is frequently fatal in the East and West Indies. It is generally occasioned by sudden colds; wounds of the nerves, and nervous parts of the body, however, slight; drawing of the teeth, and affections of the gullet or wind-pipe....Suppression

of the erysipelas or rose, hysterics, rheumatism, worms, and the bite of venonious serpents, are among the many causes of this dangerous disorder.

[In the United States, this dreadful disease most commonly proceeds from the following causes.

1. Wounds from nails, or other pointed instruments, in the hands or feet. When these occur, warm spirits of turpentine, or common salt must be applied, and the wound enlarged if the remedy cannot reach to the bottom. The object is to raise a slight inflammation, which will prevent the general affection. The irritation should be kept up for ten or fifteen days, when the wound may be permitted to heal.

If symptoms of the disease appear, whether the local application has, or has not been made, the wound must be immediately enlarged, and filled with the above stimulating applications, or powdered cantharides (Spanish flies). *If the patient be robust, some blood may be advantageously taken away:* cold water must then be dashed every twenty minutes upon the body, which must be rubbed dry, and the patient put to bed.

Wine must be freely, but regularly given, and alternated with brandy and water; when these cease to produce an effect, oil of amber may be substituted. Opium internally does no good, but externally applied in the form of laudanum, is highly beneficial; sweet oil also may be rubbed over the throat with great advantage. .....When the violence of the disease has subsided, Peruvian-bark may be freely given, with generous diet. The warm bath must never be used.

2. The second cause from which this disease proceeds in the United States, is, *exposure of the body to night air, after being much heated.*

The general treatment is the same, as in the former case, except that when a sickness at stomach occurs, *an emetic should precede the use of other remedies.*

The quantity of stimulants, which a sufferer in this complaint will take without injury, is immense: The only rule to be observed with regard to their administration, is, to give them in *regularly increased doses* until the desired effect be produced. An obstinate costiveness attends the disease, and is very difficult to remove. Calomel in doses of ten or fifteen grains with as many of jalap, or clysters of tobacco water may be given. A salivation quickly raised, has frequently proved a cure.

The editor has been particular upon this awful complaint, because it is very frequently fatal in the country, during the summer season.]

During the continuance of this spasmodic disease, the patient can only receive sustenance through his teeth, or by means of nutritive clysters, His food ought, therefore, to consist of the most nourishing broths and jellies; thus, by the judicious application of the different remedies above stated, and by carefully avoiding to take cold, the locked jaw may probably be restored to its former situation, in the course of a few days.

JAY, or *Corvus glandarius*, L. a well-known British bird, remarkable for its beauty. It is about 13 inches in length; its forehead is white streaked with black; the head is covered with a tuft of long

feathers, which the bird erects at pleasure into the form of a crest: the whole neck, back, breast and belly, are of a faint purple colour, intermixed with grey.

Jays build chiefly in woods, where they construct their nests with sticks, fibres of roots, and tender twigs, in which the females, deposit from five to six eggs of a dark olive colour. They feed on acorns, as well as every kind of grain, and are very mischievous, frequently destroying young chickens and eggs: nor do they spare birds that have been caught in a trap, or entangled in bird-lime.... The most effectual method of taking them is that already pointed out in the article JACK-DAW.

ICE, a solid, transparent, and brittle body, formed of some fluid matter by the power of cold, or, more properly speaking, by the abstraction of heat.

Ice concretes generally on the *surface* of water; but this effect frequently varies under different circumstances. In the northern parts of Europe, there are three species of ice: 1. That which is formed on the surface. 2. Another kind, which congeals in the *middle* of the water, and bears some resemblance to small hail; and, 3. *Ground-ice*, that is produced at the bottom; especially where it meets with any fibrous substance to which it may adhere. The last species is full of irregular cells; and, on account of its inferior specific gravity, it produces many singular effects, by bringing up heavy bodies from the bottom of the water in which it is formed. The ice that concretes in the middle of the water, rises to the top, where it unites into large masses: the formation, however, both of this, and of the *ground-ice*, takes place only during the intense and sudden frosts, in shallow waters, the surface of which is disturbed either by the wind or the current of a stream, so that it cannot be easily consolidated.

In many countries, the warmth of the climate renders ice not only a desirable, but even a necessary article: hence it becomes an object of some importance to procure it in a cheap and easy manner.... For this purpose, in the East Indies, three or four pits are dug on a large open plain, each of which is about thirty feet square, and two feet deep; the bottoms are covered to the depth of eight or ten inches with dried straw, or the stems of sugar-canes. On this bed are arranged, in rows, a number of unglazed pans made of porous earth, about a quarter of an inch thick, and an inch and a quarter deep, which are filled about sun-set, with water that has been boiled and become cool. Early in the morning, a coat of ice is found on the pans, which is broken by striking an iron hook into its centre, and then conveyed in baskets to the place of preservation.

The most expeditious method, however, of producing ice, consists in a combination of *sal ammoniac* with *nitre*. It was first discovered by BOERHAAVE, whose experiments were repeated and confirmed by Mr. WALKER, apothecary to the Radcliffe Infirmary, Oxford; but he found that his thermometer sunk 32° in a solution of sal ammoniac, when BOERHAAVE's fell only 28°: nitre alone reduced it to 19°. On mixing the two salts, in equal proportions, the power of generating cold was considerably increased; so that the water was

cooled to 22°, while the thermometer stood at 47° in the open air. By adding some powder of the same composition, and immersing in the mixture two small phials filled with water, he found it in a short time frozen.

Having observed that *Glauber's salt*, when it retains the water of crystalization, produces cold in a state of solution. Mr. WALKER made an experiment of its effects when mixed with the other salts before mentioned; in consequence of which the thermometer sunk from 69° to 19°, and he obtained ice, while the thermometer stood as high as 70°. Lastly, by previously immersing the salts in the water of one mixture, and then making another of the cooled materials, he was able to sink the mercury in the thermometer to 64°. Thus, he froze a mixture of spirits of wine and water, in the proportion of seven of the latter to one of the former; and by adding a quantity of the cooled materials to the mixture in which this was frozen, the quick-silver fell to the extraordinary depth of 69 degrees.

Various other methods of procuring artificial ice have been contrived, particularly by the aid of æther; but that volatile spirit is too expensive for domestic purposes, and a satisfactory account of the process would exceed our limits.

Ice has lately also been introduced into medicine; and its external application was attended with success in various disorders, especially in typhus fever, acute rheumatism, strangulated ruptures, and chronic inflammations of the eyes, after proper evacuations had preceded. It has likewise been advantageously employed for removing a retention of urine; and an instance lately occurred, in which a person was effectually relieved, by immersing his legs for five minutes in a pailful of ice and water taken fresh from the river. At first, it occasioned intense pain, but in a few minutes after the patient had retired to bed, his complaint was alleviated; and, in the course of twelve hours, he was perfectly restored. Such a powerful remedy, however, should be resorted to only under medical superintendance.

ICE-BOAT. See BOAT.

ICE-CREAM, is prepared by mixing three parts of cream with one part of the juice or jam of rasberries, currants, &c. The mixture is then well beaten; and after being strained through a cloth, is poured into a pewter mould or vessel, adding a small quantity of lemon-juice. The mould is now covered, and plunged in a pail about two-thirds full of ice, into which two handfuls of salt should be previously scattered. The vessel containing the cream is then briskly agitated for eight or ten minutes, after which it is suffered to stand for a similar space of time; the agitation is then repeated, and the cream allowed to subside for half an hour, when it is taken out of the mould, and sent to table.

ICE-HOUSE, a repository for the preservatson of ice during the summer months.

[An ice-house may be built at a very great expense, but it may also be built for a sum, which no farmer however poor, ought to object to. If *he wish one*, he *may have it*. At Gloucester Point tavern, below Philadelphia, on the banks of the Delaware, is an ice-house, which fully shows with what

little expense, how simple the manner, and under what supposed disadvantageous circumstances, an excellent ice-house may be built.

The ice-house alluded to, is 16 feet square; four feet above, and nine feet below the surface. The marshy nature of the soil, does not permit a greater depth. The pit which slopes a little, is lined with logs, as far as the surface, and faced with slabs, which are continued above ground. There is a sink at bottom covered with logs, upon which the ice rests, and this sink empties into a pipe, which conveys the water of the melted ice, or of the river, to a hogshead sunk about eight or ten feet from the corner of the house, whence it is pumped up by a common ship pump. A thick bank of earth is thrown up outside, as high as the ice extends. The roof is boarded; and the entrance is through a small door at the gable end, next the tavern which is south of the ice-house, and but four feet from it. Straw is liberally used to cover the ice, and to line the pit. A large willow shades the ice-house on the north-east, and west, and the tavern protects it on the south. The ice-house holds 91 one-horse-cart loads, and keeps ice enough to supply the house, until the succeeding winter, in which it is filled.

The Gloucester ice-house may be considered as a valuable model for all those who wish to enjoy this summer comfort, and who live in marshy countries. But in dry situations, other plans may be adopted. The following is recommended by Mr. Thomas Moore, of Montgomery county, Maryland, in his late excellent treatise on the subject,

" The most favourable situation is a north hill side, near the top. On such a site, open a pit twelve feet square at top, ten at bottom and eight or nine feet deep: Logs may be laid round the top at the beginning, and the earth dug out, raised behind them, so as to make a part of the depth of the pit. A drain should be made at one corner; the spout to carry off the water should descend from the pit except a short piece at the outward extremity which ought to rise thus,  the depressed part will always stand full of water, and prevent communication with the external air. Dig holes in the bottom of the pit, and set therein four perpendicular corner posts, and an intermediate one on each side; let the insides of these posts form a square of eight feet in the middle of the pit. Then, in order to avoid dampness from below, cover the bottom three or four inches deep with dry sand, if it can be conveniently got. The next thing to be done, I consider as the most material, and also expensive part of the business; which is fixing a proper floor for the ice to rest on. In order to do this, let three or four sleepers supported at the ends, be placed across the square included by the posts; their upper edges about a foot from the bottom, but so that the plank laid thereon, may have a descent of a few inches towards one of the sides next the drain. The plank should be two inches thick and about half seasoned; jointed, grooved and tongued or lathed, and grooves cut near the joints, in the upper side so as to prevent any water from going through. The floor must extend a little without the inner sides of the posts; so that the water drip-

ping from the sides may fall on the floor. Then fix a plank, or spout at the lower end of the floor in such a manner as to convey the water into the drain. The floor being completed, begin at the bottom and plank up on the insides of the posts with $\frac{3}{4}$ or $\frac{5}{8}$ plank, [boards] lapping the lower edge of each a little on the one below so that the water may be kept on the inside: this done to the top of the posts (which should be even with the top of the pit) and the inside will be completed; except that it will be proper to cover the floor with loose plank previous to putting in the ice. The roof may be composed of any materials, and in any form that will defend the contents of the pit from wet, from the direct rays of the sun, and also admit a free circulation of air; I do not think any could answer the purpose better than one made of thatch, supported by posts a few feet from the ground.

The mode of filling the house remains now to be considered; and on this much depends.

Early in the winter fill the interstice betwen the ice chamber and the bank with clean dry straw closely pressed; this being done early, will prevent the earth from freezing: which would be injurious to the sides of the pit. The ice should be collected in the coldest weather; let it be exposed at least one night to the cold atmosphere after it is removed from the water; which will reduce its temperature many degrees, if the weather is severe. When put into the house, it should be beat small, and I think it would be useful frequently to sprinkle it with a watering pot whilst putting in: the mass would by that means be rendered more compact. When the chamber is filled, cover the whole with a good thickness of straw; but I should suppose it would be best to cover the ice first with plank, supported by the sides of the chamber, only leaving a door to descend through.

Such a house as has been described will contain about ten tons, and I am persuaded will be found sufficient to afford an ample supply for almost any private family.

This is nearly the kind I had in view when I estimated the expense would not exceed twenty dollars; and if we calculated on a great part of the work being done by the family; which in the country in general, it very well may; the actual out lay, in many places need not be five dollars. Those who are less sparing of expense, if they choose, may wall, or what is better, plank up the sides of the pit; and finish the roof in a stile of elegance.

In level situations, where a drain cannot be conveniently dug out from the bottom of the pit: I should suppose it would answer very well to enclose the ice by a mound raised entirely above the furface of the earth, through which the water may be discharged; in other respects to be similar to the foregoing description. This perhaps would not be quite so cool a repository as if under the surface of the earth; unless the mound was very thick; but I am persuaded that the loss of a few degrees in temperature bears very little proportion to the advantage resulting from dryness.

If it were certain the floor would be perfectly tight, the passage of heat to the ice would be rendered still more difficult by confining a quantity of dry ashes, saw-dust, straw, or some other nonconductor between the floor and the bottom of the pit.[b]

In Italy, where ice is much used, both as a medicine and in diet, it is formed in the following manner: Balls of snow are wetted, and placed one on another in the ice house. The bottom parcel rests on logs, through the interstices of which the dissolved water drops, and the whole mass is formed into a solid body of ice in the course of the winter.

The following points should be carefully attended to in building an ice-house:

1. Whether the pit be lined with stone, brick, or logs, a vacancy should be left, of at least one foot, between the surrounding earth and lining, and filled with straw. The quality possessed by straw of slowly conducting heat, is advantageously acted upon, in many instances by those who are ignorant of the principle, which is finely illustrated and proved by Count Rumford. A second wall, leaving less space between it and the first, than between this and the surrounding earth, and likewise filled with straw, would tend more effectually to exclude the heat, which is commonly observed to cause great waste of ice at the sides. Straw should likewise be liberally used between the wall and body of ice.

2. A chimney, to convey away the heated moist air, is an essential requisite to all ice-houses not much used, and which are placed in unfavourable situations: it is the want of this chimney which occasions the disappointment of many persons, anxious to preserve a supply of ice in summer.

3. Mr. Moore suggests the probability of a thatch roof being equal to any, for the purpose of covering an ice-house; but there can be no room to doubt of *straw* being the *very best* material for a roof within reach of the farmer. If a single roof be used, the thatch should be as thick as possible, but a double roof (each roof being thatched) would more completely keep out external heat. Where the roof consists of boards and shingles, the inside may be covered with straw, to be supported by battens.

In South Carolina and Georgia, where the ice must be imported from the northern states, and still greater precaution is necessary, the space between the double roof may be lined with powdered charcoal, or ashes, which are well known to be the worst conductors of heat. The body of charcoal need not be more than six inches thick.

4. A floor over the body of ice would further protect it from waste by excluding heat. This floor should be covered with straw, and also have a door, to enable a person to descend to the ice.

5. Ice-houses should be filled in the coldest weather, and the ice broken into lumps about the size of a man's head. Cold water may be dashed on every layer of ice, but *salt must not be used*. During very cold nights, the door of ice-houses should be left open.

6. Pits for ice-houses should be dug down to gravel, or have a drain to carry off the dissolved water.

Ice is not only a great comfort in summer, but may be rendered essentially profitable to the farmer, by enabling him to take butter and meat to market in such order, as to command an extraordinary price.

A very simple plan has been contrived, for this purpose, by Mr. Moore, before mentioned, and thus described in his treatise on ice-houses.

"I had a cedar vessel made in the form of an oval tub, nearly as wide at bottom as top; in this was fitted as large a straight sided tin vessel as it would contain, open at top. The interstice between the sides of the two vessels was covered by an edging of tin, soldered to the upper edge of the tin vessel, and extended on to the upper edge of the wooden vessel, to which it was nailed, [but this edging ought to have been of wood]. Through this last was cut a hole about an inch and a half space on each side, for the purpose of putting in ice; over the whole was fitted a wooden lid fastened by a hinge on one side. A coat or case of coarse cloth lined with rabbit skins, the fur side next the cloth and the pelt next the wood. The coat was in two parts for the convenience of raising the lid: the part attached to the lid, had an edging which hung down and covered the joint when shut. The tin vessel was 14 inches long, 6 wide, and 12 deep, and contained 22lbs. of butter wrapped in linen cloth, and put in edgeways".

Machines upon the principle of that just described, may be applied, as Mr. M. observes, to a variety of purposes in families.

Mr. Moore's inventions are secured by patent, but his terms for permits are so easy, that no one can object to them. He directs letters *post paid*, to be addressed to, Thomas Moore, Brookville, Maryland, and they will be attended to.]

JELLY, a form of food, prepared either from the juice of ripe fruits, boiled to a proper consistence with sugar; or without it, from the flesh, intestines, or bones of animals, which are stewed so as to become perfectly stiff and firm when cold.

The jellies of fruits are cooling, and acescent; in all disorders of the first passages, they are of eminent service, especially when diluted with water....On the other hand, those prepared from animal substances are *very* nourishing, and useful to invalids. They ought, however, to be uniformly made of *young* meat; as the flesh of old quadrupeds and birds is hard, tough, and productive of a thick glutinous jelly, which is extremely difficult of digestion.

A wholesome jelly may be obtained by boiling a large portion of blanched oats, with some hartshorn shavings and currants, together with a leg of veal cut to pieces, and the bones of which are broken. These ingredients are to be boiled or stewed over the fire, in a sufficient quantity of water, till the whole be reduced to a kind of jelly, which, when strained, and suffered to grow cold, will become firm and elastic. Such a preparation is much used on the Continent, in all hectic disorders, and eaten with broth of snails, or cray-fish [! !] A few spoonfuls of the jelly are taken every morning, diluted with a bason of either of those broths, or any other warm liquor; a dish which furnishes grateful and invigorating aliment to phthisical patients, or those who are afflicted with lingering complaints. Although we are no advocates for *liquid food* in general, which is apt to distend the stomach, and impair the powers of digestion, by not affording them proper exercise: such preparations may occasionally be very useful if conjoined with a due proportion

of either well baked bread, or other substantial nutriment.....See also Broth. [Bones.]

Jerusalem-artichoke. See Artichoke.

Jessamine. See Jasmine.

JET, a black inflammable concrete which becomes electrical by friction; attracts light substances, in the same manner as amber, and, when burning, emits a bituminous smell. It has the grain of wood, is but moderately hard, and splits most easily in a horizontal direction.

Jet is always found in detached masses, lodged in other strata; it abounds no where so plentifully as in England, being very common in Yorkshire, and other northern counties, though it is also discovered in many clay-pits about London. Ireland, Sweden, Prussia, Germany, and other parts of Europe, as well as the East Indies, produce this fossil. It admits of a high polish, and is chiefly converted into small boxes, buttons, bracelets, and other toys. In conjunction with oils, it forms an ingredient in varnishes, and, when mixed with pulverized lime, it is said to produce a hard and durable *cement*.

ILIAC PASSION, or *Ileus*, one of the most dangerous maladies with which mankind is afflicted, and in which the motion of the bowels is totally inverted. It generally arises from spasms, or obstructions in the alimentary canal, by which the passage or descent of the excrements is impeded; an unnatural stricture of the intestines, ruptures, &c. violent exertions of the body, such as leaping, running, or riding; the lifting of great weights; eating of unripe fruits, especially pears and nuts; the drinking of sour and ill-fermented liquors; the use of too strong laxatives; worms and obstinate costiveness, are among the many causes which generate this fatal disorder.

Where the iliac passion proceeds from a distortion of the intestines, there is little hope of recovery. Various remedies, however, have been used, with different degrees of success. Thus, large blisters applied to the most painful part, while emollient clysters are injected; fomentations; camphor externally and internally; ipecacuanha in the smallest doses frequently repeated; linseed oil, both in small draughts, and in the form of clysters; as well as the warm bath, have all been found sometimes of service, but more frequently unavailing. And though experience has but too often evinced, that this obstinate disorder is not under the controul of medicine, yet it may, in many instances, be arrested in its progress, and perhaps eventually cured, when a just *diagnosis* can be formed of its nature.

[Frequent and copious bleedings, repeated clysters of cold water, oily injections, blisters to the bowels, and in case of obstinate costiveness, *dashing cold water upon the feet*, are the most effectual remedies for this disease.

Quicksilver has been often recommended, and may be tried when other remedies fail.]

The diet of patients affected with the iliac passion, ought to consist of very light food, taken in moderate quantities, and neither too warm nor too cold. Wines, spirits, acrimonious and irritating substances, as well as heating liquors, ought to be carefully avoided; because they are always productive of bad consequences. Thin gruel, prepared from barley or oatmeal or

weak chicken broth, are equally proper; and the patient's drink ought to consist of decoctions of emollient vegetables, or water in which toasted bread has been boiled, or clear whey. Particular attention ought also to be paid to the mind, which should be preserved in a state of cheerfulness and serenity.

IMPATIENT. See BALSAMINE.

IMPLEMENTS *of Husbandry*, denote those machines or instruments which are used in the different branches of rural and domestic economy; such as ploughs, harrows, hoes, churns, threshing-machines, straw cutters, &c.

The improvement of husbandry, by the construction of more perfect implements, calculated to facilitate its operations, has within the last fifty years become an object of general attention; and, with this view, the patriotic agricultural societies, especially those of Britain, have granted liberal premiums to the inventors of useful and ingenious machinery on condition that such contrivances should be communicated for the benefit of the public. Much however, remains to be done in this important department of economy; which, we apprehend, will not be carried to its relative degree of perfection, *till the science of husbandry form a more leading part of education at public schools*. The ancients have bequeathed to us a variety of excellent and classical books on the subject: hence it were sincerely to be wished, that, by accurate translations of these works, accompanied with critical and explanatory notes, by professional farmers, the study of agriculture may be revived, and thus our knowledge of this important science progressively enlarged.

Lately, indeed, a repository for agricultural implements has been opened in the vicinity of Hanover-square, we believe, under the inspection of Mr. MARSHALL, whose name we have had frequent occasion to mention in the progress of the present work. This repository is daily open to the view of the public, at a trifling expense; and we understand, is designed to contain models and specimens of the most valuable and practical improvements in husbandry: by such an institution, we trust that the prejudice in favour of antiquated, and aukward implements, will be gradually vanquished. Several societies of agriculture have lately been re-established in France, and they have devoted their attention more especially to this interesting subject. *Ploughs*, adapted to different soils, are doubtless the most essential requisites to the successful management of a farm; and several of these primary implements having recently been contrived, which promise to be eminently useful, we shall give an account of their construction, illustrated with such cuts as may appear necessary, under the article PLOUGH.

IMPOSTHUME. See ABSCESS.

INARCHING, in gardening, is a method of engrafting, denominated *grafting by approach*; and is employed when the stock intended to graft on, and the tree from which the scion is to be taken, are situated so near that they may be easily joined.

This operation is performed in the month of April or May, in the following simple manner: The

branch designed to be inarched, is exactly fitted to that part of the stock with which it is to be united, after having previously pared away the rind and wood on one side of both the stock and branch, about the length of three inches, that they may uniformly combine, and thus promote the circulation of the juices. A little tongue is then cut upwards in the graft, and a notch made in the stock for inserting it; so that when they are joined, the tongue will prevent their slipping, and the graft more closely adhere to the stock. They are next tied with some bass, or worsted ; and, to exclude the air from the wounded part, it is covered over with grafting clay. Lastly, both the graft and stock are fastened to a smooth and proportionate stake, which is driven into the ground, in order to withstand the effects of high winds, that would otherwise displace them. After having remained in this situation about four months, they will be sufficiently combined, and the graft may then be separated from the mother-tree; sloping it close to the stock, and laying fresh clay around the wounded part.

Inarching is chiefly practised with oranges, myrtles, Jasmines, walnuts, firs, &c. which do not flourish by the common mode of engrafting. It ought, however, on no account to be performed on such orange trees as are designed to grow to a considerable size ; for they seldom *live long* after this operation.

Inclosures. See Commons, Fence, and Hedge.

Incubus. See Night-mare.

INDEX, in literature, expresses that part of a work, or single volume, which is generally subjoined to its conclusion, and arranged in alphabetical order, with particular references to the pages where the respective matters or subjects are discussed.

An *Index* should be distinguished from what is usually called, *Table of Contents*, which affords an analytical view of the different topics, progressively, while the index is intended to facilitate occasional reference. Both are useful : the former, to enable the reader to take a comprehensive survey of the whole work, and to appreciate at once the author's *logical* talents of diving and arranging the subject of which he treats, as well as to form an idea of its extent and importance. In an *economical* respect, however, the latter is a more valuable addition to a book than an analysis of its contents, which are in a manner evident from the heads of chapters or sections : whereas an *Index* tends to save time and labour, that are often unnecessarily wasted in searching for particular passages. Hence a large, ponderous volume, without an *alphabetical* index, may be aptly compared with an extensive street, or town, the houses of which are not provided with numbers.

Indian Berry. See Cocculus *Indicus*.

Indian Corn. See Corn.

[Indian Turnip. See Turnip.]

INDIGESTION, or *Dyspepsia*, a complaint which chiefly consists in the loss of appetite, and is generally attended with nausea, flatulence, vomiting, heart-burn, costiveness, as well as other unpleasant symptoms, without any immediate affection either of the stomach or other parts.

Indigestion arises from a variety of causes, such as the eating of hard, unwholesome food, and unripe fruit; drinking too large draughts of liquor, during, or immediately after dinner; the immoderate use of opium, and of spirits; taking too large quantities of tea, coffee, or any warm relaxing liquors; tampering with emetics or laxatives; the want of free air, and exercise; and in consequence of indulging in any of the depressing passions.

Persons of weak, delicate habits particularly the sedentary and studious, are frequently subject to indigestion. A radical cure of it can be effected only by removing the debility of the stomach and whole system. With this intention, emetics, or gentle purgatives, should be previously administered, in order to clear the alimentary canal. Next, tonics, such as valerian, Peruvian bark, &c. may be resorted to with advantage; and, if the complaint be accompanied with putrid eructations, or other signs of putrescency, it will be advisable to take the strongest *antiseptics*, especially the marine acid, or spirit of salt, sufficiently diluted with water. Many, however, have been effectually cured by the *liberal* use of cold water alone. In great laxity of the stomach, considerable benefit has been derived from the use of the columbo root, in small and frequent doses. The chalybeate waters are, to phlegmatic habits, in general, of great service; and the moderate drinking of sea water has often been productive of good effects.

Medicines, however, will be of little or no advantage, unless the patient take moderate and daily exercise in the open air, and endeavour to preserve a cheerful, contented mind. Early rising ought to form an indispensahle part of his attention; while his diet should consist principally of solid, but tender aliment, which he, from experience, has found easy of digestion.

INDIGO, a drug for dyeing blue, prepared from the indigo plant, or *Indigofera tinctoria*, L. a native of the warmer parts of Asia, Africa, and America.

Instead of describing the particular culture of this exotic, which cannot be raised with success, even in the hot-houses of our climate, we shall briefly point out the characters of the best indigo that is imported, and which has frequently undergone the various processes of adulteration with earth, ashes, and pounded slate. The genuine drug ought to be of a rich dark blue colour, approaching to black, and, when broken, to display the lustre of copper: nor should it sink in water, or leave behind any sediment, after being dissolved. The purest indigo is brought from Guatimala, in South America.

Although large quantities of this dyeing material are annually produced in the British colonies, and thence imported, yet we might easily dispense with this costly drug, which, to the detriment of native productions, and especially that of WOAD, was first brought to Europe by the trafficking Dutch, about the middle of the 16th century. Indeed, there is every reason to believe, that many plants of English growth would yield excellent substitutes for indigo. We have, in the progress of this work, already hinted at several vegetables of this description; and, as a repetition of their names and properties would be here superfluous (though incomplete, at the present letter of the alphabet) we

shall purposely delay that useful task till the conclusion of our labours, when it will appear in the *General Index of Reference.*

Indigo is much used in washing, to impart a blueish cast to linen; painters also employ it as a water-colour; and dyers consume large quantities in the various tints of blue cloths.

In March 1797, a patent was granted to Mr. JOSEPH BARTON, chemist, for an improved method of preparing indigo for dyeing wool, &c. in a more perfect manner than has hitherto been discovered. As, however, this patent is not expired, and the process is too expensive to be attempted for the gratification of the experimenter, we refer the inquisitive reader to the 9th volume of the *Repertory of Arts and Manufactures*, where it is minutely described.

INDUSTRY, *Houses of*, are building's erected in various parts of England, in order to maintain the sick, infirm, and aged poor; while children and healthy adults, who are received into the house, labour for their support, and are allowed a certain part of their earnings, as an inducemet to industrious habits.

These buildings, doubtless, contribute to the comfort of the poor, and are calculated to lessen the severe burthen of parochial rates: they conduce to the rearing of an healthy, honest, and virtuous race of peasantry. Of this patriotic tendency is the Shrewsbury House of Industry; which, being excellently adapted to the purpose, has given birth to many similar institutions lately formed in various parts of Britain. We are no advocates for the toleration of *beggars*, who, under the imposing appearance of misery, extort alms from credulous charity: nor is it consistent with good policy to tolerate those hordes of idlers and drunkards, especially in the metropolis; for numbers of such as do strictly belong to the list of *mendicants*, might be very properly committed to the work-house, under the description of *vagrants;* because they prey upon the vitals of a deluded public. On the whole, however, we are of opinion, that industry would be more effectually promoted, if the poor were allowed to retain their little independence, and encouraged to persevere in their honest endeavours, by small bounties, occasionally bestowed on them by the parish. At the same time, a comfortable provision might be made for the infirmities of age, by means of *friendly societies*, which in the course of a few years, would supercede the necessity of building houses of industry. And, if those benevolent associations could be so organized that the rich and poor should contribute according to their respective abilities, we hesitate not to say, that the latter would be better assisted than they *can be* at present, on the irregular plan of parochial assessments, which, in too many instances, nearly *double* the rent of the premises. The opulent would become better acquainted with the *real* wants and miseries of the poor, while these would gradually acquire both principles and habits of industry: in short, they would thus be reconciled to their lot, and prosper under the management of the wealthy.

Many objections have been urged for and against houses of industry. Those readers who wish to peruse the arguments on both sides of the question, will derive equal amusement and information from Mr.

Wood's pamphlet, entitled, *Some account of the Shrewsbury house of Industry*, (8vo. 5th edit. 3*s* 6*d*. Longman and Rees, 1800) in which several objections are ably answered.

INFANCY denotes the first period of human life, previous to the age of seven years.

Having already treated of the diet proper for infants, under the article Food, and of their amusements, under the head of Exercise, we shall at present offer only a few remarks, chiefly relating to their dress.

The most fatal period to infants is, doubtless, during the two first years of their existence; for it has frequently been observed, that greater numbers die under that age than at any subsequent stage of life. This mortality is supposed principally to arise from the erroneous practice of confining their tender bodies, as soon as they behold the light, by means of tight bandages, so that neither the bowels nor limbs have sufficient liberty to act in the easy manner designed by Nature.

In order to obviate the abuses before mentioned, the infant's dress should be so contrived, that it be neither too warm nor too tight, and that not only the influence of the air may have its full effect, but also the motion of the body be duly facilitated. Hence a roller, about six or seven inches broad, should be made, either of linen or woollen cloth, as the season may require, though a knitted bandage would be far preferable; as, from its more elastic nature, it may with less pressure or constraint be turned round its body. It would be superfluous to enumerate the other parts of the *upper dress*, as every judicious parent will readily accommodate it to age and circumstances. The head should be lightly covered; and, while travelling, in cold or hot weather, a cap or hat may be safely used, but again laid aside, as soon as the infant returns to the house, or to a mild temperature, where every compression of the head is useless, and frequently hurtful.....Indeed, the whole dress ought to be as loose as possible, because ruptures, and other fatal consequences, often originate from a contrary treatment.

Stockings are by many considered as unnecessary articles of the dress of infants; yet, as our offspring is not intended to go *bare-legged*, when adults, we conceive no reason for depriving them of proper hose, especially if they can be kept *dry*, and be adapted to the length of the foot, both in the winter and summer; though such covering will be more useful in the former season: their shoes also ought to be sufficiently wide....See Foot.

From the first moment of their existence, infants are liable to the attacks of disease. It deserves, however, to be remarked, that the descendants of sedentary, idle, nervous, or weak persons, are chiefly exposed; while those of the peasant and husbandman, being early inured to fatigue and hardships, are not only more healthy, but also less reduced by occasional indisposition, and better able to bear external injuries....We cannot, in this place, enter into any details respecting the management of infantine disorders, as they are discussed in the alphabetical series. (See also *Vitiated bile*): hence we shall conclude these remarks with adding, that,

1. The dress of children ought materially to differ from that of

adults: 2. No distinction ought to be made in the dress of either sex during the first years of infancy: and, 3. Let the dress of children be clean and simple, but never too warm....See also SLEEP.

INFECTION, the communication or contraction of some disease, from the effluvia, which arise either from the sick, or from the apartment in which they reside: hence it does not necesssarily imply actual contact.

Having already pointed out the proper means of avoiding personal infection, under the article CONTAGION, we shall at present confine our attention to the most efficacious method of preventing the propagation of infectious diseases.

This important object has lately been investigated with equal zeal and success by the patriotic Society for increasing the Comforts, &c. of the Poor; from whose abridged *Account of the cure and Prevention of Contagious Fevers in the Metropolis*, (8vo. 2d edit. 6d) it appears that not less than *three thousand one hundred and eighty-eight persons have annually died*, upon an average (within the last hundred years) in consequence of infectious fevers.

The alarming increase of this malignant epidemic, is justly attributed to the close and confined dwellings of the poor, where the circulation of fresh air is almost entirely prevented. With a view to check such rapid progress several benevolent members of the society above mentioned have formed a well-digested plan; in conformity to which, appropriate houses are to be opened, and provided with the requisite medical assistance of every kind for the reception of such diseased poor as it may be deemed necessary to remove from their own habitations: others in the mean-time, will receive professional advice at home, and be regularly visited by the physician appointed for that purpose. This laudable establishment is supported by subscription; and we trust, from the known liberality of Britons, that it will never fail for want of effective support.

In places where infection has actually prevailed, the necessary precautions are immediately taken to prevent its return; and the society has, therefore, appropriated a certain sum of money for purifying the tainted habitations of the poor. Their method consists, simply, in washing the walls of the room with *hot lime* which will render the place perfectly sweet.

The following rules are to be observed in houses during the prevalence of contagious fevers: they are extracted from an interesting letter lately published by Dr. HAYGARTH, on the prevention of infectious diseases.

1. As safety from danger depends entirely on cleanliness and fresh air, the door of a sick room, where a person labours under an infections fever (especially in the habitations of the poor), ought never to be shut: a window in it should generally be opened during the day, and frequently during the night.

2. The bed-curtains ought never to be closely drawn round the patient; but only on the side next the light, in order to shade the face.

3. Dirty utensils, clothes, &c. ought to be frequently changed, immediately immersed in cold water, and washed clean when taken out.

4. All discharges from the patient should be instantly removed, and the floor near the bed be rubbed every day with a wet mop or cloth.

5. As some parts of the air in a sick room are more infectious than others, both attendants and visitors should avoid the current of the patient's breath, the exhalation ascending from his body, especially if the bed-curtains be closed, and also the vapour arising from all evacuations. When medical or other duties require a visitor or nurse to be in such dangerous situations, Dr. HAYGARTH observes, that infection may be frequently prevented by a temporary suspension of breathing.

6. Visitors ought not to enter infectious chambers, *fasting;* and, in doubtful circumstances, on their departure, it will be advisable to blow from the nose, and spit from the mouth, any infectious poison which may have been inhaled by the breath, and may adhere to those passages.

As these directions are highly important, we trust they will be scrupulously followed, in all cases where any infectious disorders unfortunately prevail.

INFLAMMATION, in medicine, is a tumor attended with unnatural heat, redness, painful tension of the skin, and febrile symptoms, which are more or less violent, according to the nature of the part affected, and the extent of the swelling.

Almost every part of the body is liable to inflammations, but chiefly the bowels, breast, eyes, &c. of which we shall treat in the progress of this article.

The termination of inflammatory tumors depends on their different degrees of violence, and the causes whence they originate, as well as their treatment. Where they appear in consequence of colds, without any previous disposition of the system, they may often be dispersed by the usual applications; but after fevers, and in persons of gross habits, they generally terminate in suppuration. In aged, infirm, or dropsical persons, however, they frequently produce mortification in gangrene.

In treating *external* inflammations, the chief object is to relieve such of the smaller vessels as are obstructed; thus to restore the natural circulation of the blood, and to effect the dispersion of the tumors. Swellings of this nature, if attended with mild symptoms, or arising from external injury, may be safely discussed. Hence various applications may be resorted to, according to the temperament of the patient. For persons of hot, gross habits, cooling external remedies are the most serviceable: by those of an opposite nature, cataplasms of warm emollient herbs may be used with advantage. The effect of these applications will be considerably promoted, by taking at the same time cooling and attenuating medicines while the diet ought to consist of nourishing aliment, that is easily digested; carefully avoiding all salted meat, pickles, spices, fermented or spirituous liquors, and whatever tends to irritate and inflame the body. The most proper food in such cases, is broth, barley-water, and decoctions of sorrel, endive, or the like cooling herbs, mixed with small portions of lemon-juice, or other vegetable acids; to which may occasionally be added a little nitre, when the inflammation

threatens to increase. But, if the tumor incline to gangrene, it requires a very different treatment, and more particularly relates to surgery. See the article GANGRENE.

INFLAMMATION OF THE BLADDER, or *Cystitis*, an affection of that part of the human frame, accompanied with swelling and pain in the lower region of the belly, frequent and difficult discharge, or total suppression of urine, &c.

Inflammations of the bladder arise from calculous concretions; obstructions in the urethra; Spanish flies, either taken internally, or applied to the skin; from wounds, bruises, &c.

In this dangerous malady, it will be advisable to resort immediately to medical assistance; but, if it cannot be easily procured, the patient may apply leeches round the abdomen. Purgatives should likewise be administered; and clysters prepared from a decoction of poppy-heads, may be injected every second or third hour. It will also be beneficial to apply continually fomentations of the same decoction to the lower belly, and to immerse the patient in the tepid bath.

Should the disease, however, terminate by suppuration, and the matter be discharged with the urine, it will be requsite to use the utmost precaution. The patient's diet ought, during the whole progress of the disorder, to consist of the mildest, though nutritive, aliment. He should also avoid every species of food and drink that is stimulant, saline or acrid; and subsist chiefly on milk, puddings, weak broths, fruits, butter-milk, &c.

INFLAMMATION OF THE BOWELS, or *Enteritis*, an acute, fixed, burning pain in the lower belly, which is attended with a considerable degree of tension in the epigastric region (see ABDOMEN). The principal symptoms that characterize this fatal malady, are obstinate costiveness; a hard and small pulse; a painful, and almost continual hiccough, together with fever, and a constant inclination to vomit.

Inflammations of the bowels may arise in consequence of swallowing any acrid substance; from violent passion; drinking large draughts of cold water while the body is overheated; the suppression of any cutaneous eruptions; repulsion of the gout; external injuries; such as wounds, contusions, &c. Persons of a plethoric habit suffer more acutely from this disorder than those of a contrary temperament.

Cure: If the belly be swelled, firm, and painful to the touch, while the pulse is hard and contracted, it will be advisable to take some blood from the arm. A blister should next be employed as speedily as possible, and mild emollient injections of barley water, gruel, &c. administered, till stools be obtained: the patient should be placed between blankets, and supplied moderately with diluent liquids, such as barley water, rice-gruel, &c. When the violence of the disorder is somewhat abated, opiates may be administered in clysters, which will be of great advantage in mitigating the pain.

As soon as the stomach is able to retain any laxative, the mildest aperients, such as tamarinds with manna, or phosphorated soda, may be taken by the mouth; but, if the disorder tend to a mortification, the treatment before stated should be

steadily pursued ; and, if gangrene eventually take place, or the disease terminates in suppuration, its course must be left to Nature, the patient being kept as quietly as possible.

During the continuance of this most alarming disorder, the diet ought to be very light ; the drinking of all stimulating, fermented, or sprituous liquors carfully avoided ; and the mind preserved in a state of tranquility. [See Bowel.]

Inflammation of the Female Breast, is generally occasioned by exposure to cold, repression of the milk, or external violence. It is known by the redness, heat and pain, either of part or the whole of the breast ; and, if the disease be considerable, it is usually preceded by a shivering, and accompanied by fever.

Where the inflammation is violent, the usual practice is to take large quantities of blood from the patient ; but, in common cases, small local bleedings, by means of a few leeches, are fully sufficient. Considerable benefit will also be derived from the application of emollient poultices, prepared with bread, milk, and cold-drawn linseed oil. The maternal milk may likewise be extracted at intervals, and the breast suspended by means of proper bandages. In some recent cases, a solution of sal ammoniac has been externally applied with success.

If the inflammation continue, it will be requisite to persevere in the use of emollient cataplasms and fomentations ; but, as the complaint is of a delicate nature, it will always be advisable to resort to proper medical assistance. [See Breast.]

Inflammation of the Ear, or *Otitis*, a painful affection of the cavity of the ear, which is sometimes consequent on the Mumps, but is more frequently occasioned by exposure to the cold. In slight cases, this affection may be removed by dropping a little warm oil of almonds into the ear, and by the application of a common poultice of bread and milk, or of a bag of chamomile flowers ; either of which ought to be made sufficiently warm. Should the disorder, however, not yield to these remedies, surgical assistance ought to be procured without delay ; lest a suppuration take place, and be attended with total loss of the organ of hearing.

Inflammation of the Eye, or *Ophthalmia*, an uncommon redness of, and acute pain in the part affected ; an inability to bear the light ; and involuntary shedding of tears.

This malady is often occasioned by external injuries, such as blows, burns, bruises, and the like. It also arises from splinters, dust, sand, lime, acrid fluids, or other extraneous substances insinuating themselves under the eye-lids ; from affections of the teeth ; the precipitate healing of old ulcers ; and long exposure to the night air.

Peculiarities : Inflammations of the eye are frequently annual ; and instances have occurred, in which they returned at stated periods, and even became chronical ; they are farther contagious, and may be caught by mere intuition of the ophthalmia in others.

Method of cure : When the disease is of a mild nature, it will be useful to put leeches to the temple of the eye affected, in a num-

ber proportioned to the age and strength of the patient: after the bleeding has ceased, a blister may be applied[behind the ear]and brisk purgatives given. To obviate the mischief arising from the use of quack medicines, such as lotions, &c. we shall briefly observe, that there is no better collyrium than simple rose-water[or weak lead water.] Beside these remedies, much benefit has been received from shaving the head, or cutting the hair; from bathing the feet and legs frequently in warm water; and, where the inflammation succeeds the small-pox, from applying infusions of marsh-mallows with sal ammoniac to the inflamed parts. In case of periodical ophthalmia, emetics have been of eminent service, and in some instances completely removed the complaint; but, if it have arisen from particles of iron accidentally dropped into the eye, they may be easily extracted by means of the magnet, and thus the disease checked in its progress.... THUNBERG advises the vapour of cajeput oil to be frequently applied; and Mr. WARE in his practical "*Remarks on the Ophthalmy*, &c." recommends a few drops of laudanum to be introduced into the eye; such a powerful remedy, however, should be administered only by the expert practitioner.

If the means before stated prove ineffectual, and the pain in the inflamed parts rather increase than abate, professional assistance must be speedily procured. Meanwhile, the eye should be carefully secluded from the influence of light, or the patient may confine himself to a dark room, having a temperature neither too cold nor too warm, and cautiously avoid a draught of air. His diet cannot be too mild..... Lastly, in this, as well as every other species of inflammation, it is of the utmost importance to abstain from all heating or stimulating aliment and liquors, from all violent efforts both of body and of mind; and to encourage an inclination to sleep.

INFLAMMATORY FEVER, a sudden and acute febrile disease, chiefly prevalent in hot climates. It commences its attack with a considerable degree of shivering, and severe pain in the small part of the back which are succeeded by an intense heat of the whole body. The eyes are red, and incapable of supporting the light; the patient suffers an insatiable thirst.

The cure of this fever is generally effected by repeated bleedings, proportioned to the patient's strength, and the violence of the disease: antimonial and aperient medicines; the liberal use of vegetable acids; neutral salts; and sudorifics, are given in the various stages, according to the urgency of symptoms. As, however, this fever is attended with great danger, it will always be more prudent and advisable, on its first appearance, to call in medical assistance.

Regimen and Diet: The room of the patient should be kept cool, by a constant succession of fresh air, and somewhat darkened; while every precaution is taken to ensure a state of tranquility. All animal food, and even broths, must be carefully avoided, as well as aromatic, fermented, and spirituous liquors. The insatiable thirst during the proxysms of this fever, may be quenched by the free use of barley-water, balm tea, or other mild vegetable infusions, acidulated with the juice of oranges, le-

mons, currants, and other sub-acid fruits.

Beside the different inflammatory diseases, of which we have briefly treated in the preceding sections, there are various other species, of inflammation, denominated from the particular organs or parts affected. Thus, the reader will find some useful hints under the article BRAIN, and, with respect to the subsequent letters of the alphabet, we refer him to the heads of KIDNIES, LIVER, LUNGS, MESENTERY, PLEURISY, QUINSY, RHEUMATISM, SPLEEN, STOMACH, TONSILS, &c.

[INFLAMMATION *(Spontaneous.)* Many substances under certain circumstances, are disposed to spontaneous inflammation, respecting which, it may be useful to caution the reader.

1. Oiled cloth, which had been painted on one side, dried in the sun, and stowed away in a storehouse in the town of Brest, inflamed, and destroyed the house.

2. Heaps of linen rags, which are thrown together in paper-manufactories, the preparation of which, is hastened by means of fermentation, often take fire, if not carefully attended to.

3. Parched Rye bran, wrapped up in a linen cloth, smoked in a few minutes, and in a short time the rag became black; and the bran being hot, fell through it on the ground in little balls. Mr. TOOKE, from whom the above fact is taken, accounts for the frequent fires in Russia, from the common practice of binding roasted bran about the necks of cattle, when affected with *thick necks*.

4. Mr. TOOKE also mentions, that the hemp magazine at Petersburgh, containing several hundred thousand pounds of hemp and flax, took fire without any apparent cause; that a roll of cere-cloth took fire in a vaulted shop, where neither fire nor candle were allowed; and that a bundle of matting, containing Russian lamp-black prepared from fir-soot, moistened with hemp-oil varnish, caused a fire in a ship's cabbin, in the road to Cronstadt. *See the account at length by* TOOKE, *in the Repertory of Arts.*

5. Pieces of woollen cloth unscowered, heaps of moist woollen yarn, or wool combings, impregnated with rape-oil mixed with butter, which is used in the combing; and packed away in unventilated rooms, have also inflamed.

6. Cotton cloth wetted with drying linseed-oil, and confined in a box, began to smoke in three hours; and on the box being opened it immediately inflamed.

7. A quantity of candles had been melted by a tallow chandler in Philadelphia, and put in a brass sieve to drain, in the evening: in the course of the night they inflamed. A similar accident occurred to the same person from a mass of candle-wick having been thrown into a barrel, after the fat had been melted from the candles.

8. A child at Hartford, Connecticut, having been burnt, was anointed with oil, in March, 1803. About three gallons were consumed, and a great part of that quantity was absorbed by the bed. The bed afterwards lay until June, in a garret, when it inflamed.

9. The spontaneous inflammation of stacks of hay is well known to farmers. The method to prevent this accident, is detailed under the article HAY, p. 265.]

INGROSSING, is the act of

accumulating or buying up corn or other provisions, by wholesale, with a view to sell the same articles at a higher price, and thus to oppress as well the poor, as those who cannot conveniently purchase a large stock. This atrocious practice has at all times been subject to severe penalties; and, having already treated of them, under the head of FORESTALLING, we refer the reader to that article.

INK, a black fluid employed in writing, and usually prepared with an infusion of galls, copperas, and gum arabic.

The chief requisites for the making of good ink, are, 1. Limpidity, so that it may flow freely from the pen. 2. A deep, uniform and black colour. 3. Durability, so that the letters be not liable to be effaced by age; and 4. It should be divested of any corrosive quality, by which the substance of the paper may be destroyed, or the writing rendered in any degree illegible. No ink, however, hitherto used, possesses all these properties; hence several ingenious chemists have been induced to make experiments, in order to render it more perfect.

M. RIBAUCOURT, in the "*Annales de Chimie*," directs eight ounces of Aleppo galls, and four ounces of logwood, to be boiled in twelve pounds of water, till the quantity is reduced to one half; when the liquor should be strained through a linen or hair sieve into a proper vessel. Four ounces of sulphate of iron (green vitriol;) three ounces of gum-arabic; one ounce of sulphate of copper (blue vitriol,) and a similar quantity of sugar-candy, are now to be added: the liquid should be frequently shaken, to facilitate the solution of the salts. As soon as these ingredients are perfectly dissolved, the composition is suffered to subside for twenty-four hours: when the ink may be decanted from the gross sediment, and preserved for use in glass or stone bottles, well stopped.

This ink exhibits a purplish-black colour in bottles; but the writing performed with it, is said to be of a beautiful black cast, which it retains, unaltered, for a considerable length of time. Each quart of the preparation contains:

	oz.	*drs.*	*grs.*
Of galls - -	2	5	20
Green vitriol -	1	2	40
Logwood -	1	2	40
Gum - -	1	0	0
Blue vitriol -	0	2	40
Sugar-candy -	0	2	40

M. RIBAUCOURT is of opinion, that ink thus prepared, may be preserved several years in a state of perfection, without depositing either galls or iron.

The ink commonly used, is manufactured by stationers, according to Dr. LEWIS's recipe; but it is ill calculated for keeping, as it deposits a black sediment, while the fluid itself is of a pale colour...... Each quart of this ink contains:

	oz.	*drs.*	*grs.*
Of galls - -	3	0	0
Green vitriol -	1	0	0
Logwood - -	0	5	24
Gum - - - -	1	0	0

Neither blue vitriol nor sugar are employed in this preparation. As, however, both the ink made after the latter method, and that compounded according to other recipes, are not adapted to resist

the effects of acids, and are consequently by no means fit for records, deeds, and other documents, M. Westrumb recommends the following ingredients, as being well calculated to remedy this inconvenience. He directs one ounce of Brazil-wood, and a similar quantity of gall-nuts, [Nicholson directs three *oz.*] to be boiled in forty-six ounces (somewhat less than three pints) of water, till the whole be reduced to thirty-two ounces, or about two quarts. This decoction is to be poured, while hot, upon half an ounce of copperas, or green vitriol; a quarter of an ounce of gum-arabic, and a similar quantity of white sugar. As soon as a perfect solution of these substances has taken place, one ounce and a quarter of indigo finely pulverized is to be added; together with three quarters of an ounce of the purest lamp-black, previously diluted in one ounce of the best brandy. The whole is to be well incorporated, and after it has subsided, M. Westrumb asserts that it will form an ink *absolutely indestructible by acids.*

[It is essential, that the above ink be well stirred, every time it is used.]

A more simple composition, is that proposed by M. Bosse, who directs one ounce of Brazil-wood to be boiled in twelve ounces of water with half an ounce of alum, till the liquid be reduced to eight ounces; when one ounce of calcined manganese is to be mixed with half an ounce of gum-arabic, and added to the liquor, which should be previously decanted, in order to render it perfectly limpid. This preparation is said to possess the property of being indelible by the use of any kind of acid, and to be superior to that proposed by M. Westrumb.

A durable ink may also be prepared by washing paper, parchment, &c. with the Prussic acid, which will not in the least injure either of these substances. The materials, thus prepared, may be written on with common ink, and a ground of Prussian blue will be formed beneath every stroke, which will remain long after the black has decayed by the influence of the air, or been destroyed by acids.

The latest, and perhaps most simple, preparation of *black ink*, is that contrived by Van Mons, who observed that sulphate of iron, or green vitriol, when calcined till it became *white*, uniformly afforded a very beautiful black precipitate. According to his experiments, the following ingredients produced an excellent writing ink: four ounces of galls, two ounces and a half of calcined vitriol of iron perfectly white, and two pints of water. The whole was infused in a cold place for twenty-four hours; adding ten drams of pulverized gum-arabic, and preserving it in a glass bottle, or glazed earthen vessel, slightly covered with paper.

[The best ink is thus made. To four ounces of good logwood well bruised or rasped, add four quarts, beer measure, of hot water. If the wood is only coarsly bruised, use 5oz. and keep the water in scalding heat (not quite boiling) for near an hour. The next day strain off the liquor, add to it while hot, 16oz. of powdered blue galls, or 20oz. of galls in sorts. Calcine to whiteness five ounces of green vitriol, and grind it up with half on ounce of blue vitriol, and half

an ounce of alum: add these to the logwood liquor: stir them well, then add four ounces of powdered gum arabic, and three ounces of white sugar. Let all the ingredients be well and frequently shaken together, and kept for a week in a warm place. Pour off the liquor for use, and the remaining ingredients will make another quart of good ink.

To improve the colour and permanence of ink. Take some of the above ink, and rub it in some Indian or China ink.

To make an indelible Ink.

The bleachers saturate any quantity of dilute nitrous acid with silver, to which solution they add an equal quantity of thick gum water, with some lamp-black in it. They write on the unbleached linnen with this, and *let it dry slowly:* no bleaching destroys it.

For common marking ink, iron may be used instead of silver.

Cotton should always be kept in an inkstand; for the ink in the cotton is kept blacker by the suspension of the colouring part; and if no more ink be present than perfectly to fill the cotton, the pen will always receive a fluid black ink, and may be charged at pleasure by a greater or less gentle pressure, at the time of taking it up, or discharged, by lodging the point for a moment upon the cotton.]

Indian Ink, a valuable black for water-colours imported from China, and other parts of the East Indies, generally in oblong square cakes, impressed with Chinese characters. The preparation of Indian ink was discovered by Dr. Lewis, according to whom it consists of lamp-black and animal glue. In order to imitate it, he directs as much lamp-black to be mixed with the glue as will be sufficient to give it a proper tenacity for making it into cakes. This composition is said fully to answer the different purposes to which the genuine Indian ink is subservient, both with regard to the colour, and the facility with which it may be applied. Dr. Lewis farther found that ivory-black: and other blacks obtained from charcoal finely levigated, may be advantageously substituted for lamp-black: ivory and charcoal, however, are generally sold in so gross a state, as to prove gritty when worked, and to separate too speedily from the water.

Ink-powder is prepared chiefly from the acid salt of galls, which may be obtained by the following process: Take two ounces of pulverized galls, and infuse them in twelve ounces of rain or river water; expose the whole for a few days to a warm temperature, and stir it occasionally; after having extracted the colouring matter, filtre the solution, and suffer it to stand in the open air for several weeks, in a vessel slightly covered. A sediment will then be gradually formed; which, after removing the mouldy skin from the top of the liquor, should be carefully collected. Hot water is next poured on this sediment, when it is again filtered and evaporated to dryness: thus, a grey crystalline salt will be produced, that is the essential basis of black ink; and which may be still more purefied by repeated solution, filtration, and evaporation.

If one dram of this salt of galls be triturated with an equal quantity of the purest vitriol of iron, and about twenty grains of perfectly dry gum arabic, a composition will be obtained, which on adding a proportionate quantity of warm wa-

ter, instantly affords an excellent black ink.

Blue Ink. One ounce of the finest indigo is first levigated in a glass mortar; then four ounces of the most concentrated vitriolic acid are very gradually poured on the powder; and, on every addition, it is stirred with a glass pestle, so that the whole mixture will require several hours. Such precaution is indispensible, as otherwise the heat generated on adding the vitriolic acid, would impair the brightness of the colour.

After standing from twelve to eighteen hours in a moderately warm place, this dense mixture must be diluted with water; not by adding this fluid to the composition, but by introducing small portions of the latter into a vessel containing such a quantity of water as may be requisite to produce a lighter or darker shade. In general, from 30 to 40 parts of water will be necessary to reduce it to a fine blue liquid.

This diluted solution of indigo is, however, in too caustic a state to be employed either as a blue dye, or as writing ink. Hence the vitriolic acid ought to be divested of its corrosive quality, by means of such a substance as may form a chemical combination with the acid, and not precipitate the indigo. If the solution be intended merely for colouring or writing on paper, it will be sufficient to add pulverized chalk in small portions, till it cease to effervesce; because a large quantity of this powder, at a time, would cause the liquid to rise above the brim of the vessel. It is easy to ascertain the point of saturation; for, when the powder of chalk scattered on the surface no longer produces any bubbles, the solution should be suffered to stand for 24 hours, then filtered through blotting paper, and preserved in bottles....If, however, this preparation be designed for dyeing silk, such as stockings, &c. it will be preferable to neutralize the vitriolic acid by the addition of aluminous earth, instead of chalk, as the former renders the colour more durable. And, if the solution is to be used for painting on silk, it ought to be previously mixed with gum tragacanth.

Green Ink. Take a glass retort containing about one quart; pour into it one pint of distilled vinegar; place it over a sand heat, and when it begins to boil, introduce into the liquid small portions of powdered verdigrease, till a saturated solution is obtained, or till no more colouring matter can be dissolved. In order to keep the latter suspended, and prevent the formation of crystals, it will be requisite to add about the sixth part of gum-arabic, in proportion to the verdigrease.

For preparing *red* and *yellow ink*, see the articles Red and Yellow.

* Printing or Printers' Ink, differs greatly from every other species: It is an oily matter of the consistence of an ointment, the composition of which is, at present, very imperfectly known, excepting to the few who are employed in its manufacture. The following recipe, however, has been found to make printing ink of a tolerable good quality: Let two quarts of linseed oil be boiled in a vessel capable of holding a triple quantity, over a strong fire, till it emit a thick smoke. It is then to be kindled with a piece of paper, and suffered

to burn for the space of a minute, when the flames must be extinguished, by closing the vessel. As soon as the oil becomes cool, two pounds of black rosin, and one pound of hard soap, cut into thin slices, are to be added ; the mixture again placed over the fire ; and, when the ingredients are perfectly dissolved, a pound of lamp-black, previously sifted, must be incorporated with the mixture, after which the whole is to be finely ground on a marble stone.

This method of making printers' ink is acknowledged to be preferable to the different recipes hitherto published. It is, however, much inferior in beauty of colour to the ink generally used, and is apt to adhere to the types, so as to make an indistinct impression. Good printers' ink, which is easily worked, without daubing or tearing the paper, while it imparts a fine colour, is a desideratum that will amply repay the attention and time bestowed upon its preparation....See PRINTING.

[T. COOPER, *Esq. furnished the editor with the following receipt*.... "Into a vessel that will hold about ten gallons, put six gallons of linseed oil, and one pound of litharge ; boil, or rather simmer the oil for about sixteen hours. About an hour before you finish, add three or four pounds of rosin, stir it well at the time. Take some of the oil, and while warm, grind it very well with lamp-black,of which the above quantity will take about 4 pounds. In a large way, it should be made in vessels, of which one close fire-place will heat above five vessels. A wet blanket thrown over the kettle, is the best thing to extinguish it." A vessel proper to boil oil in, will be described under the article OIL.

A good *copper-plate printing ink*, is a great desideratum in the United States.]

SYMPATHETIC INK, a liquor employed for writing on paper, so that it may return its natural whiteness after the letters are formed, till it is held near the fire, rubbed with another liquor, or some other expedient used to render the characters legible.

Sympathetic inks are prepared from various substances, such as bismuth, lead, &c. Thus, a solution of common sugar of lead in water, if employed with a clean pen, will remain concealed till it is wetted with a solution of the liver of sulphur, or is exposed to the vapours of such liquid ; in which case it will assume a deeper or lighter brown shade, in proportion to the strength of the sulphureous gas. By the same process, words written with a solution of bismuth in spirit of nitre, will appear of a deep black colour.

Another sympathetic ink may be easily prepared, by diluting oil of vitriol with a sufficient quantity of water, to prevent the paper from being corroded. Letters drawn with this fluid are invisible when dry, but, on being held near the fire, they assume a perfectly black colour. The juices of lemons, or onions ; a solution of sal ammoniac, &c. will answer a similar purpose, though their application is more difficult, and they afterwards require a different degree of heat.

On the subject of removing or discharging *spots*, occasioned by differents inks on linen, silk, or woolen cloth, we shall treat under the article SPOTS.

INN, a place appointed for the reception and entertainment of travellers.

INOCULATION, or *budding*, in horticulture, an operation performed on apricots, nectarines, plums, cherries, or other stone-fruit trees, and also upon oranges and jasmines. It is reputed to be superior to every other species of grafting, and is effected in the following manner:

A sharp knife, with a flat handle must be first procured, in order to raise the bark of the stock for the insertion of the bud. Next, some strong *bass* should be soaked in water, in order to increase its strength, and to render it more pliable. The cuttings being then separated from the trees that are to be propagated, a smooth part of the stock must be selected, about five or six inches above the surface of the soil, if intended for dwarfs; but if designed for standards, they should be budded at least five feet above ground.

An horizontal incision is now to be made across the bark of the stock, from the middle of which a perpendicular slit should be drawn, about two inches in length. The leaf is next cut off the bud, the foot stalk remaining entire; and a cross cut is made about an inch beneath the eye, after which the bud is to be cut off, with part of the wood adhering to it. The bark of the stock is then to be gently raised with the handle of the knife, and the bud inserted exactly between the rind and the wood of the stock; after which they are bound closely with the *bass*, care being taken to leave the eye of the bud open.

In the course of three weeks, or a month after the inoculation is performed, those buds which have a fresh and flourishing appearance will be joined, when the bandage ought to be removed. In the succeeding month of March, the stock must be cut off in a sloping direction, about three inches above the bud: the shoot proceeding from it should now be fastened to the remainder of the stock for one year, after which the latter ought to be removed by the knife, immediately above the bud.

The proper season for this operation is from the middle of June to that of August. The fruit-tree first inoculated, is generally the apricot, and at length the orange-tree, which, however, ought not to be budded till the end of August. For this purpose, cloudy and moist weather is the most propitious; for, if the inoculation be attempted in the middle of the day, the shoots will perspire so rapidly as to leave the buds destitute of moisture.

INOCULATION, in *medicine*, is the transferring of distempers from one subject to another, particularly of the small and cow-pox.

The practice of inoculation is of great antiquity in the East, whence it was introduced into Britain, early in the 18th century; though not without many struggles, and violent opposition, under the frivolous pretext, that it was contrary to the principles of Christianity, and usurping the sacred prerogatives of the Creator. On account of its superior utility, however, it has at length triumphed, and is now almost generally adopted, excepting among a few fanatics, who, from superstitious motives, confirmed by obstinacy and ignorance, still object to it as an unlawful, and even sacrilegious attempt. The curious reader, who is desirous to become ac-

quainted with these objections, will find them stated, together with a defence of inoculation, in Dr. LETTSOM's *Medical Memoirs*.

Various methods have been adopted, for the artificial communication of the small-pox; the most effectual of which appears to be that of making a puncture in the skin, or removing the epidermis of the upper arm with the point of a lancet, dipt in variolous matter. For the proper treatment of persons during the progress of inoculation, the reader will consult the article SMALL-POX, where the comparative advantages of its recent substitute, the *cow-pox*, will be concisely stated.

INSECTS, in natural history, form the most diminutive class of animals, which are distinguished by certain incisures or indentations found in their bodies....See also ANIMAL KINGDOM; vol. i.

Having already stated, under the articles APPLE-TREE, CABBAGE, CORN, CATTERPILLAR, FRUIT-TREES, HOT-HOUSE, &c. the most efficacious methods of destroying different kinds of insects, we shall at present communicate such expedients as have not yet been specified, but which deserve to be more generally known.

BLITE-INSECTS, (*aphides*, or plant-lice), may be destroyed by the smoke of tobacco, or by scattering on them Scotch snuff. Another method is, to place a few of the larvæ of the beetles, called Lady-birds, or Lady-cows (*Coccinellæ septem-punctatæ*) on the plants infested with the blites, which, it is asserted, will be thus in a short time destroyed......Dr. DARWIN, however, is of opinion, that the most ingenious, as well as the most effectual method of preventing the depredations of these insects, consists in artificially propagating the larvæ of the aphidivorous fly, which has been observed by naturalists to deposit its eggs where the aphis abounds.

As soon as the larvæ are produced, they devour the aphides around them, seizing the latter in their mouth, and extracting their juices. We have not been able to ascertain their exact duration in a caterpillar state, but believe in about a fortnight they contract, and attach themselves to some solid matter, by means of a little gluten which is discharged from their mouth; and are thus converted into *chrysales* or *nymphæ*. In this state the insect continues 10 or 11 days, when it bursts its cell, and emerges a perfect fly.

If these insects could be collected, carefully preserved during the winter season, and properly disposed on nectarine and peach-trees, early in the spring, Dr. DARWIN thinks, it is probable that the depredations of the blite might be counteracted, "by the natural means of devouring one insect by another; as the serpent of Moses devoured those of the magicians."

A kind of bellows has been invented by Mr. GREEN, of her Majesty's flower-garden, Kew, for the purpose of destroying the red spider, and other noxious insects in hot-houses and pineries, with the fumes of burning tobacco. The same noxious vermin may likewise be exterminated by burning (when the hot-house is shut), matches moistened with a spirituous tincture of asa-fœtida, and rolled in a powder consisting of equal parts of sulphur and Scotch snuff. It will

also be of service to wash the frames of hot-houses, &c. with four ounces of sublimate, dissolved in two gallons of water; but this operation should be performed with the utmost caution, on account of the corrosive properties of the mercury.

In the *Annales de Chimie*, M. TATIN gives an account of a compound which he has successfully used for exterminating insects. He directs $1\frac{3}{4}$ of a lb. of the best black soap; a similar quantity of flowers of sulphur; 2 lbs. of any kind of mushrooms; and 15 gallons of rain or river water, to be employed. The fluid is to be divided into two equal parts, one of which is put into a barrel, together with the soap and mushrooms, after the latter have been somewhat bruised. The other half is to be boiled in a kettle with the sulphur inclosed in a bag, and fixed to the bottom of the vessel, by means of a stone or other weight.

These ingredients are to be boiled 20 minutes, during which the sulphur should be well agitated with a stick, that the water may be the better impregnated. When the liquid is taken from the fire, it is to be poured into the barrel, and stirred daily, till the mixture become in a high degree fetid: for the older and stronger the composition is, the more speedy and powerful will be its effects. The liquor is to be sprinkled on the plants infested with insects; great numbers of which it destroys on the first application; it will, however, be necessary to repeat the aspersion, in order to exterminate ants, or other vermin that breed beneath the soil: and, for this purpose, from two to eight pints are required, according to the depth and extent of their nests.

Although insects are very injurious to vegetation, yet Dr. DARWIN is of opinion, that they may be rendered extensively useful as a *manure*. Hence, in the summer months, he recommended heaps of dung to be supplied with water, for promoting the propagation, and nourishment of myriads of vermin; which, when suffered to decay on the soil, would greatly contribute to its fertility.

The catching and preservation of insects, for the collections of naturalists, is indeed a necessary practice, though it has at all times been branded with cruelty. Hence, in stating the most proper methods of effecting this purpose, we shall likewise point out the easiest expedients to deprive them of life.

Beetles, and other insects of the same class, may be caught either with a gauze net, or with a pair of pincers covered with gauze. As soon as they are secured, it will be advisable to immerse them either in hot water, or in spirits of wine, where they will be instantaneously killed: next, they may be fixed to a piece of cork, in a creeping direction, and exposed to the air till all their moisture be evaporated.

Bugs, crickets, and other insects of the hemipterous class, may be put to death in the manner just mentioned, or by pouring a drop of etherial oil of turpentine on their head.

Moths, butterflies, and all other flies which are furnished with membranous wings, may be taken with gauze nets; then pierced through the shoulders between the fore-wings, with a pin; and, after gently squeezing the breast of the insect, it will immediately perish.

Lobsters, scorpions, or such vermin as have no wings, may be pre-

served in spirits; and the various other kinds of insects may either be killed with oil of turpentine, or the fumes of sulphur.

After the insects are deprived of all moisture, they should be placed in the boxes or cabinets where they are to remain; these should be kept very dry, and closely shut, to prevent the depredations of small vermin. The bottoms ought likewise to be covered with pitch, and paper on the surface; or, they may be preferably lined with cork, which should previously be impregnated with corrosive sublimate, in a strong solution of sal ammoniac.

INSTINCT, denotes that faculty or disposition of mind, by which animals are led spontaneonsly to perform whatever is necessary to preserve the individual, or to continue the species; independently of any instruction or experience, and aiming at no determinate object.

Thus, infants suck immediately after they are born; thus, too, insects deposit their eggs in all climates, invariably in such situations as are peculiarly favourable for the hatching and support of their future progeny.

In succeeding years, the faculties of the juvenile mind enlarge, and our conduct is, or at least ought to be dictated by *reason;* while the actions of the brute creation are generally directed by *instinct*. With respect however, to the *human* instinct, philosophers are by no means agreed; some affirming that man possesses a greater number of instincts than any species of brutes, while others assert that human nature is utterly destitute of any power or propensity, that can with propriety be denominated *instinctive*. Amid such diversity of opinions, it is difficult to decide; though it cannot be denied that infants afford very strong proofs of a natural impulse. But the inquisitive reader, who is in search of farther information, may with satisfaction peruse the late Mr. Smellie's *Philosophy of Natural History*, 8vo. and Dr. Reid's *Essays on the Active Powers of Man;* in which the subject is considered in different points of view.

INSURANCE, in law and commerce, denotes a contract by which one party engages to pay the other, for a certain premium or consideration, such losses as he may accidentally sustain. The common kinds of insurance are:

I. *Against loss at sea*; a most beneficial institution, eminently calculated for promoting the security of trade. It is at present conducted by a regular system of rules, under the immediate sanction of the law, the decision of courts of justice, and the usage of merchants. There are severel societies for this kind of insurance in London; but, as it would be incompatible with our limits to enter into any details, we shall point out Mr. Park's masterly *System of the Law of Insurances* (8vo. Butterworth, 12*s*. 1801); in which the subject is fully considered. A smaller work of reference, designed for the use of merchants, and relating to *Insurance against losses at Sea*, has lately been published by Mr. Burn.

II. *Against fire;* for which purpose various offices are established in Britain: the principal of them is, probably, the *Sun Fire-office*. This class is divided into 3 species, namely:

1. *Common insurance:* buildings, the whole external walls of which are of brick or stone, with coverings of slate, tiles, or metals, and in which no hazardous trades are carried on, or hazardous goods are deposited. In this division are also comprised goods which are not hazardous, and which may be kept in such buildings.

2. *Hazardous insurances*, which include buildings covered with slate, tile, or metal, whether built of timber, plaister, timber and plaister, brick and timber; and also buildings, the external walls of which are *not* wholly of brick or stone, and in which no hazardous trades are carried on, or hazardous goods are deposited: and brick or stone buildings with the coverings above mentioned, containing hazardous trades or wares. Also goods, deposited in all timber, plaister, timber and plaister; and brick and timber buildings; hemp, flax, pitch, tar, cotton, turpentine, resin, oil, spirits, and the like, are classed among hazardous insurances, as likewise are the trades or manufactories using the last mentioned articles.

3. *Doubly hazardous insurances:* namely, all the buildings mentioned in the preceding section, however covered, if they be occupied by hazardous trades or goods; and all thatched buildings.

Ships, vessels, barges, and other craft, together with their cargoes; glass, china, earthen-ware, pottery, bottles, bottled liquors in trade, ornaments, shells, fossils, ores, medals, curiosities, oil of vitriol, cork, statuary, and figures in wax, plaister, and marble; are all included in this subdivision, to which may be added the trades of boat-builders, cart-grease-makers, cork-cutters, varnish, flambeau, and lamp-black-makers, hartshorn and vitriol works, oil, silk, and linen manufacturers, and japanners.

Such are the species into which insurances against fire are divided; and that our readers may form some estimate of the expense of insuring goods, &c. against loss or damage by fire, we have subjoined the following brief table, in which the different annual rates, payable at the British Fire office in the Strand, may be seen at one view...Beside these rates, however, there is a duty of three shillings to be paid to government, for every policy of insurance where the sum insured does not amount to 1000*l*. and of six shillings, if it amount to 1000*l*. or upwards.

		Common.		Hazardous.		Doub. Hazard.		
	£.	s.	d.	s.	d.	s.	d.	
Any sum not exceeding	1000	2	0	3	0	5	0	per Cent.
	2000	2	6	4	0	6	0	
	3000	2	6	5	0	7	0	
	5000	3	0	5	0			

When the sum insured is large, a higher premium per cent. is demanded; and money, papers, pictures, gun-powder, and jewels, are excluded....If an article be falsely described, in order that it may be insured at a lower premium, the policy is justly void. An insurance made on the same subject at different offices, must be specified by

indorsement on the policy ; and, in case of loss, the offices pay a sum in proportion ; as well as all the expenses incurred in attempting to extinguish fire, or to save goods, even though the endeavours should not be attended with success. And if the value of an article be partially insured, and receive damage by fire, the society is bound to make restitution only to the extent of the sum for which the premium is paid.

III. *For lives:* by virtue of which, on the demise of the party insured, a sum of money becomes due to the person for whose benefit the insurance was made. In this respect also, several societies grant polices of insurance for certain premiums: and, though our limits do not allow us minutely to specify the rules and rates of computation which different associations have adopted, yet we think it will be useful to exhibit a few particulars relative to the premiums paid by persons, who insure either their own lives, or those of others in which they have a certain interest. In the following table we have stated the *rates of insurance on lives*, fixed by the *Westminster Society*, (No. 429, Strand), which was established is 1792 : it is calculated to shew the premiums for insuring *one hundred pounds*, upon the life of an healthy person, from the age of 8 to 67 years, within the limits of Europe, but not upon the seas, viz.

Age.	Premium per cent. for one year.			Premium per cent. per annum, for an insurance for seven years.			Premium per cent. per annum, for the whole continuance of life.		
	l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
8 to 14	0	17	9	1	1	5	1	17	7
20	1	7	3	1	9	5	2	3	7
25	1	10	7	1	12	1	2	8	1
30	1	13	3	1	14	11	2	13	4
35	1	16	4	1	18	10	2	19	10
40	2	0	8	2	4	1	3	7	11
45	2	6	8	2	10	10	3	17	11
50	2	15	1	3	0	8	4	10	0
55	3	5	0	3	12	0	5	6	4
60	3	18	1	4	7	1	6	7	4
65	4	15	2	5	10	10	7	16	9
66	5	0	1	5	17	7	8	4	1
67	5	5	6	6	5	2	8	12	1

	l.	*s.*	*d.*
Thus, a life not exceeding the age of 30 years, may be insured for 100*l.* to be paid in case of death within one year, for	1	13	3
Within seven years, by paying annually till the insured shall die, or the seven years be elapsed,	1	14	11
Whenever the death shall happen, by paying annually till that event,	2	13	4

Another method of insuring for the benefit of survivors, consists in paying an annual premium for a certain sum recoverable *on the death of one person named out of two;* but, as this mode of securing a *competency* is doubtless more objectionable to the party that is obliged to pay the annual premium, than either the preceding *simple*, or subsequent *double* chance of obtaining an equitable reimbursement, we have been induced to subjoin the following table, which exhibits the premium of insurance of one hundred pounds, payable when *either of two persons* shall die within the limits of Europe, but not upon the seas.

Age.	*l.*	*s.*	*d.*	Age.	*l.*	*s.*	*d.*
10	2	17	1	40	5	11	9
15	3	5	0	45	6	7	4
20	3	13	11	50	7	7	8
25	4	0	10	55	8	12	2
30	4	8	11	60	10	4	9
35	4	19	0	67	13	15	8

We have purposely omitted, in this table, the intermediate as well as the unequal ages of the parties whose lives are *jointly* insured; because the reader will be enabled to form a sufficient idea of the different rates, by comparing the present abstract with that of the preceding calculation. Lastly, the same duties are imposed by government for insurance on lives, as those we have mentioned against losses by fire.

INTEREST, implies the premium or sum, paid for the loan or use of money.

The rate of legal interest has varied, and been progressively reduced, during the last two centuries; according as the quantity of specie has increased by accessions of trade, the introduction of paper-credit, and other circumstances.

INTERFERING, a local disease incident to horses. It arises from various causes; and though this malady is sometimes constitutional in the animal, yet it is more frequently occasioned by an improper method of shoeing; in consequence of which the horse moves his hind feet so closely together, that hard scabs are gradually formed by their continual friction, and the disorder at length is attended with halting or lameness.

According to professor BRADLEY, *interfering* may be cured by a compound made of three parts of fresh sheep's dung, and one part of rye or weaten flour, well dried. These ingredients should be formed into a cake, then baked in an oven, and applied warm to the part affected, which will thus speedily heal; or, it may be anointed with a mixture of turpentine, and verdigrease finely pulverized, by the use of which the scabs in general shortly disappear.

INTERMENT. See BURIAL; and Apparent DEATH.

INTERMITTENT FEVER. See AGUE.

INTESTINES, in anatomy, are those hollow membranous tubes of

the human body, commonly termed the *guts* or *bowels*, which extend from the right orifice of the stomach to the anus. They are six times longer than the whole body, and by Nature destined to receive the *chyme*, or the aliment, so called after it is converted into a kind of pulp, which they retain for a time; then to mix it with the intestinal juice and bile, to separate and propel the chyle into the milk-vessels, and to eliminate the excrements.

The intestines are extremely irritable. If one of the bowels be slightly cut, the edges of the wound retract equally; and if it be penetrated or cut through, they curl themselves back, so as to envelope the upper parts; and the inside is thus completely turned outwards. For an account of the constituent parts and denominations of the intestines, the reader will consult the article ABDOMEN.....See also INFLAMMATION of the BOWELS.

INTOXICATION, is a term expressing that depravity of human nature, which requires no further explanation, as it is but too often practised both by the vulgar, and those whose *professions* lead us to expect a very different conduct.

Having already exposed the moral turpitude of DRUNKENNESS, under that article, we shall now point out a few of the consequences that necessarily result from the brutal indulgence in that odious vice.

The state of intoxication greatly resembles that of an incipient palsy or apoplexy. Inebriated persons stagger in all directions; they stammer; every thing appears double; their tongue is in a manner paralytic, and they are deprived of the faculty of speech. This imbecility extends to the mind, which is thus rendered totally incapable of reflection. As the brain is over charged with blood, the vessels pressing on that part are very liable to burst, from the least accidental concussion; and the unfortunate victim of such folly may expire, while he remains insensible of his danger. Hence he ought to be conveyed into a cool rather than warm room, and placed between blankets, with his head considerably raised; but the legs should be in a pendent situation, and the feet bathed in lukewarm water. Every tight ligature of the shirt, waistband, garter, &c. must be immediately relaxed, and diluent drinks, such as barley or rice-water, plentifully given, though in small portions. Next, a gentle emetic is to be introduced, and the throat stimulated with a feather dipped in oil: after vomiting, the patient generally falls into a profound sleep, from which he awakes weak, trembling, and affected with a violent heart-burn, and acidity of the stomach; especially if wine has been the favourite liquor. To remove the latter complaint, calcined magnesia may be taken with advantage, and afterwards moderate draughts of negus or coffee. Plethoric individuals, however, will better consult their health, by drinking cold water only, which is one of the most salutary restoratives: and during the fit of intoxication, it will sometimes be necessary to open a vein; an expedient which may rescue such persons from the brink of destruction. But, if they have been inebriated by ardent liquors, so that a vapour or smoke proceeds from their mouths, equal quantities of milk and barley-water ought to be instantly poured in; or where these liquids could not be easily procured, the fresh

urine of a healthy subject has been found to afford an excellent substitute. Nor can there be any reasonable objection against this remedy, in cases of a desperate and degrading nature.

[A labouring man some years since assured the Editor, that a draught of his own urine would at any time restore him when drunk, to perfect sobriety.]

Instead of expatiating on the long train of miseries and painful disorders with which habitual intoxication is sooner or later attended, and of which we treat in the alphabetical order of human maladies, we shall conclude in the words of the philosophic SHAKESPEARE, who very pertinently remarks, that "Drink provokes or stimulates the desire, but it takes away the performance."

JOHN's-WORT, or SAINT JOHN's-WORT. See *Hypericum*.

JOINT, generally speaking, signifies the juncture of two or more things: it is also applied to the human frame, in which case the joints are anatomically called *articulations*.

The joints, like other parts of the body, are subject to a variety of disorders, such as sprains, rheumatism, &c. of which we treat in their respective order. We shall, therefore, briefly mention a patent granted in 1796, to Mr. FRANCIS LOWNDES, for a new invented machine, called *Gymnasticon*, which is peculiarly calculated for exercising the joints and muscles. The whole frame may be constructed of wood only, or conjointly with metals, of any shape or dimensions, so arranged, by means of cranks, fly-wheels, and treading-boards, as to give motion, both voluntary and involuntary, to the joints, limbs, and muscles of the human body. As, however, this patent is unexpired, and cannot be satisfactorily explained, without the aid of an engraving, we refer the inquisitive reader to the 6th vol. of the *Repertory of Arts and Manufactures*, where it is fully specified.

JOURNAL, or DIARY, properly signifies a day-book, register, or account of particular circumstances occurring daily, and deserving to be noted.

Journals are of extensive utility, in an economical point of view; and we are convinced, that all persons engaged in any active pursuits, especially those of rural and domestic economy, would avoid many inconveniences, by keeping regular accounts. This object, we conceive, might be easily attained, by arranging the pages, ruled with columns, and pointing out the names of workmen, together with the several days of the week, in which the duration and nature of the work done, and the industry or idleness of labourers, might at once be exhibited, by means of simple characters. To these may be added *four* columns; one specifying the rate or price of the labour per day, another containing the number of days, and length of time individuals have respectively worked; a third, for the sum total due to them; and the last for the insertion of occasional remarks.

This plan is well adapted to general purposes; but those who wish to avail themselves of an useful form, solely calculated for agricultural affairs, will find an excellent plan engraven, in the 17th vol. of *Annals of Agriculture*.

JOURNAL also denotes a critical account of literary performances. Of this kind we have several month-

ly publications, which, in general, do strict justice to the works that pass under review. In the present state of society, however, it has often been seriously lamented, that any journal should be made subservient to party principles; especially where religion or politics are concerned. Hence it has frequently been suggested, that, instead of anonymously undermining the reputation of literary works, and injuring literary property, reviewers ought, on such occasions, to affix their signature to every *critique*, and support their strictures by *fair* quotations selected from the book which is submitted to their judgment. Thus, their criticisms would become less *dangerous*, but more *authentic* vehicles of information. The character of a new work would likewise claim greater attention, from those who are in any degree acquainted with the merits of the reviewer: and, though a plan of this nature may probably, at first, meet with many objections, especially by those authors and publishers who are supposed to live upon friendly terms with the dictators of the secret tribunal; yet we hesitate not to say, that many and great advantages would eventually result from this candid and impartial measure. On the other hand, it is maintained, that the *free* republic of letters, by disclosing the names of critics, would be deprived of numerous valuable observations, which are equally pointed and instructive. This powerful objection, however, appears to be inconclusive; because impartial justice is the first maxim of every moral institution. Besides, anonymous writers, when influenced by party-zeal, (as frequently happens), possess an undue advantage over authors who risk their reputation before a discerning public; and according to general principles of equity, every man has a right to know his enemy, provided he does not conceal himself in an ambuscade.

JOY, one of the most powerful mental emotions, accompanied with an extraordinary degree of pleasure. The effect of this sensation, if not too violent, invigorates the whole animal frame, and facilitates the cure of diseases.

Sudden joy, however, is often as injurious as the operation of either grief or terror; and many instances are recorded, in which the precipitate communication of unexpected news has proved immediately fatal. In order to prevent so dreadful a misfortune, such information ought not to be imparted, till the person to whom it relates, has been cautiously apprised, and thus prepared to undergo the various emotions and sensations that necessarily arise in an organized system. Hence we should fortify the mind equally, for encountering the most agreeable as well as the most disastrous tidings.

IPECACUANHA, a medicinal root imported from the West-Indies. There are three kinds distinguished by the eye, namely, the ash-coloured, or grey, brown, and white; but the first of these is justly preferred; for it is more efficacious than the white, and less violent in its operation than the brown sort.

The ash-coloured ipecacuanha, as imported from Peru, is a small wrinkled root, bent and contorted into a great variety of figures; its cortical part is compact, brittle, and on breaking, presents a smooth, resinous surface; it has little smell,

but a somewhat bitter and subacrid taste, so that it covers the tongue with a kind of mucilage.

According to GEOFFROY, NEUMANN, DALE, and SIR HANS SLOANE, the roots of a kind of dog's bane (*apocynum*), are frequently substituted for the genuine ipecacuanha, and have in various instances produced fatal effects.... But, if the above-mentioned characters be attended to, accidents of a similar nature may easily be obviated.

Ipecacuanha is one of the safest and mildest emetics, and possesses this peculiar advantage, that it passes off by the skin or bowels, if it should not operate by vomiting. In dysenteries, it is almost a specific, and often contributes to perform a cure in a very few days.... When given in powder, its action is more certain than in any other form: hence it is now employed in many diseases, where full vomiting is indicated; for which purpose from 15 or 25 grains are prescribed for a full dose. It is also beneficially administered in very small doses, so as neither to operate by vomiting, purging, nor sweating; for instance, a third or fourth part of a grain, to be taken every half hour or oftener, with a view to vellicate the intestinal canal, and by its nauseating effect, to give a different tone to the action of the stomach and bowels. Thus, it is recommended to be given in the paroxysm of spasmodic asthma, as well as in obstinate coughs; and a dose of three or four grains every morning, in chronical asthmatic cases.

[There are several native plants which, from possessing an emetic quality, are called in the country, *Ipecacuanha*. The chief are, 1. *Euphorbia-Ipecacuanha*, or Spurge.... This is very common in many parts of the United States, particularly in the dry and sandy soils of New-Jersey. It flowers early in the spring. The root boiled in water is extremely active, and should only be used in cases where poison has been swallowed. 2. *Spiræa, trifoliata*, or Indian physic, BOWMAN'S root, is a common shrub: Its emetic power resides in the bark of the root. It may be safely given in doses of twenty-five or thirty grains; and is a common remedy in the country for the intermittent fever. It is also occasionally given to horses to mend their appetite....3. *Asarum canadense*, or wild ginger; called colt's-foot in Virginia. This plant has already been noticed under the head ASARABACCA. Both root and leaves are used, but the juice of the latter is commonly given, and is powerful in its operation....4. *Podophyllum peltatum*. In South-Carolina, this plant is called *Hippo*, and according to the information of Mr. WM. BARTRAM, is also a powerful vermifuge. From twenty to sixty grains of the root are given, in proportion to the age of the patient.]

IRON, the hardest and most extensively useful of the imperfect metals: it is naturally of a livid, whitish-grey colour, and found in great abundance in various parts of the world, both in a pure state, and intermixed with other fossil matters.

The iron manufactured in Great Britain is obtained from three different kinds of ores: 1. The *Lancashire ore*, thus denominated from the county where it abounds; being very heavy; of a fibrous texture; a dark purple colour, in-

cling to black; and lodged in veins like other metals. 2. The *bog ore*, which resembles a deep yellow clay, and has probably been deposited by some ferruginous rivulets: it is found in strata from 12 to 20 inches thick, and of various breadth. 3. *Iron stones*, of an irregular shape, which frequently lie in beds of great extent, and, like other stony masses, are sometimes intersected with seams or veins of pit-coal.

After the ore is dug out of the earth, it is crushed in a mill, and washed in a stream, in order to separate the grosser particles of earth. Next, it is melted in furnaces, heated with coke, charcoal, peat, or turf; near the bottom of which, by means of a tap-hole, the liquid metal is discharged into furrows made in a bed of sand. The larger mass, which settles in the main furrow, is called by the workmen, a *sow*; and the smaller ones, *pigs* of iron. Stoves, grates, &c. are formed by casting ladlefuls of the rough metal into proper moulds made of sifted sand. In this state it is called *cast-iron*; but if cooled too hastily, it becomes brittle, and is apt to crack like unannealed glass: it is not malleable, and is so hard as to resist the file. With a view to improve it, the raw iron is now melted down a second time in another furnace, where a strong blast of air is impelled on the surface of the metal; in consequence of which its fusion is considerably facilitated, and the iron concretes into a mass called a *loop*, that is conveyed beneath a large hammer raised by the motion of a water-wheel. The metal is there beaten into a thick square form, again heated so as nearly to melt it, and then forged. By repeating this process, the iron is rendered perfectly malleable, and at length formed into bars for sale.

Lately, however, *cast-iron* has been reduced to a state of malleability, by passing it through rollers, instead of forging it. For this valuable improvement we are indebted to Mr. HENRY CORT, of Gosport, who in the year 1783, obtained a patent for preparing, welding, and working various sorts of iron, by means of machinery, &c. As, however, this specification would be intelligible only to iron manufacturers, the inquisitive reader will consult the 3d. vol. of the *Repertory of Arts, &c.* Yet justice requires us to observe, that the raw, or cast iron is, by Mr. CORT's process, perfectly freed from those impurities which are not discharged by the common methods of rendering this metal malleable; and that it has been proved by experience to be equal, and, in some cases, superior, to the best Swedish iron. As Mr. C's patent is now expired, we trust it will be generally adopted at Birmingham, Carron, Colebrook-Dale, and the other iron manufactories of Britain; because the metal thus treated, may not only be procured at a cheaper rate than it is sold at present, but a saving will be made of *one million* sterling per annum, which is now paid to Sweden and Russia for bars, while we possess a sufficient quantity of the raw materials, which may be worked at home to that amount.

Beside the *cast* and *forged* iron, there is an intermediate state, in which that metal is soft and tough. This is called STEEL, and is usually made from the best forged iron, by cementation with certain inflammable matters: some account of

the process will be inserted in its alphabetical series.

Iron being of such essential service for a great variety of purposes, several persons have obtained exclusive privileges for different inventions to which it may be applied......Among these, the patent granted to Mr. JONATHAN TAYLOR for casting oval-bellied pots, and nealing, turning, and finishing the same, &c.; then Mr. ROWLAND BURDON's, in 1795, for a method of making, uniting, and applying cast-iron blocks, to be substituted for key-stones, in the construction of arches; and Mr. JOHN WILKINSON's in 1794, for making cast metal or pig iron from the ore, and manufacturing it into bar, or any other malleable iron, deserve particular notice. The reader will find these, together with the various patents relative to the iron manufactory minutely described in the different volumes of the *Repertory of Arts and Manufactures*.

Beside its utility as a material for implements of agriculture, &c. iron is eminently adapted to the purpose of dyeing cotton. From the various experiments made by CHAPTAL, it appears that the oxyd of iron has so great an affinity for cotton thread, that if the latter be immersed in a saturated solution of this metal in any acid, it assumes instantaneously a chamoy-yellow colour, which becomes more or less deep, according to the strength of the liquors, and the length of time it has been exposed to the air. The colour thus communicated is fixed; resists both air and water, and also alkaline leys; nor is its durability in the least affected by washing it with soap; which on the contrary, imparts to it additional brightness. The oxyd of iron, if precipitated on any stuff, easily unites with the fawn colour obtained from vegetable astringents; and, by varying the strength of the soda, soap, or other mordants employed in dyeing, an infinity of shades may be produced. Thus, by means of a boiling heat, the oxyd of iron may be more intimately combined with the astringent principle. These colours may likewise be rendered brown, as they are susceptible of a variety of shades, from a bright grey to a deep black tint; by simply passing the cotton impregnated with astringent vegetable matter through a solution of iron.

When long exposed to the air, iron is very liable to become rusty, especially in moist situations: hence an effectual method of preserving it bright, still remains to be discovered. Various compositions have indeed been contrived for this purpose; but none appears to be more serviceable than common oil, though its use is on many occasions both troublesome and disagreeable. To obviate these inconveniences, it has been recommended to heat the iron to such a degree, that it cannot be touched without burning the hand, then to varnish it with new white wax, and expose it to the fire, till the wax is completely imbibed by the metal, which should next be rubbed over with a piece of serge.....According to others this metal may be perfectly secured from the effects of rust, by plunging it, while red hot, into linseed oil, which is suffered to drop off till it become dry, and then wiping the iron with a clean cloth. Thus a black crust or varnish is formed, which renders it impervious to moisture. Again, others pour melted lead into the oil, be-

fore it is applied to the *heated* iron; but both preparations require a considerable degree of skill and precaution.

As vessels, made of this metal, are liable to cracks, which frequently render them useless, we insert on the authority of M. Kasteleyn, the following directions for preparing a lute calculated to fill up such fissures: Take six parts of yellow potter's clay, and one part of iron filings; incorporate these ingredients with a sufficient quantity of linseed-oil, so as to form the whole into a paste of the consistence of putty.

Although a variety of varnishes have been contrived for securing iron and steel, in a polished state, from the effects of *rust;* yet we are persuaded, that the following is the most simple and effectual method of preserving them. It is well known, that the oil expressed from the fruit of the chocolate-tree never becomes rancid, provided the nuts have been moderately roasted, before they are submitted to the press. This oil is asserted by M. Von Crell, to be eminently adapted to the purpose before stated: and we may add, from recent experience, that the animal oil obtained from *eels*, if applied to polished iron, steel, or other metals, especially when used in machinery, such as wheel work, has been attended with similar good effects.

In medicine, iron is chiefly employed as a tonic and corroborant: when properly prepared, it is given with advantage in diseases proceeding from laxity and inactivity of the digestive organs, such as indigestion, flatulency, colic, &c. It is also of considerable service in hypochondriacal affections, intermittent, tertian, quartan, and other fevers; but it seldom agrees with either bilious or plethoric constitutions, and is, like all active drugs, much abused by quacks and other pretenders, who should not be suffered to trifle with the health and lives of the multitude.

Iron-moulds, are spots on linen, occasioned by its exposure to damp situations, and also by ink accidentally dropped on the cloth. They may be removed by moistening the stained part, sprinkling it with a small quantity of the essential salt of lemons; [See Lemons.] after which the linen is to be rubbed over a pewter plate, and the blot washed out with warm water. But a less expensive method consists in wetting the spot, applying to it a few drops of spirit of salt, or lemon juice; then rubbing it for a minute or longer between the fingers, while it is carefully held over a hot smoothing iron, or a bason filled with boiling water, the steam of which greatly facilitates the removal of the stain.

[*Iron stains on Mahogany*, are taken out by dilute spirit of salt confined to the spot by wax.

The following account of the present state of the iron works in the state of Pennsylvania, was communicated by John Kean, Esq. of Dauphin county, to John A. Hanna, representative in Congress for that state, and published in the spring of the present year.

"I have long had a desire to know the state of the iron business in this commonwealth; believing that correct information of that subject would be pleasing as well as useful to you in considering the great national interests, I send you the underwritten statement, which has been forwarded by application to the representatives from the dif-

ferent counties, and is certainly correct as far as it goes ; perhaps two or three forges and bloomeries have escaped our notice.

"In Pennsylvania there are furnaces 28 ; forges 72 ; slitting mills 11 ; tilt hammers 12 ; steel furnaces 2, exclusive of air furnaces at and near Philadelphia.

"The 28 furnaces, at a moderate calculation, will make annually each 750 tons of pig and castings, which would amount on the whole to 21 thousand tons; four furnaces in our neighbourhood have, for the last three years, each made yearly from 12 to 1500 tons ; I therefore think we calculate far within what they actually will make, when we state the annual amount at 20,000 tons.

"Seventy-two forges, at 180 tons each will annually make 12,960 tons of bar-iron. Some forges run much higher, and some fall short of that quantity, but upon the whole I think we may safely calculate upon that average.

"Eleven slitting mills using each 250 tons annually is 27750 tons, and about 150 tons are yearly manufactured into steel.

"If you were in possession of similar information from the other states, Congress would then be able to judge of the propriety of laying such protecting duties on iron imported as would properly encourage this manufacture in our own country. We are at present able to make not only all the iron wanted in the United States, but a considerable quantity for exportation. Our iron is equal in quality to any in the world."

The reader is referred to *Nicholson's Phil. Journal*, and to *Tilloch's Phil. Magazine* for a body of very valuable information on the subject of the manufactory of iron. In the latter work, are contained several papers by Mr. MUSHET of the Calder iron works, which deserve particular attention, being the production of the *important union* of a philosophical inquirer, and practical operator.]

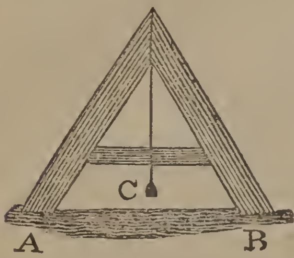
IRRIGATION, signifies the watering, or artificial flooding of land.

The principal objects in irrigating the soil, is a proper supply of water ; and, if that fluid abound with mud, the land will be more permanently improved, than by conducting a clear spring over its surface: hence it is certain, that if the liquor collected in farm-yards, the washings of different sinks, ditches, and the drains of the contiguous fields, could be conveyed into the common stream, the water would acquire a more fertilizing property.

But, in order to manage this important branch of rural economy with success, it will be requisite previously to ascertain, whether the stream will admit of a temporary wear or dam being constructed across it ; whether the water can be raised to such a height as to overflow a particular spot, without injuring the contiguous land ; and whether it can be drawn off with the same facility as it is conducted on the soil. If these objects can be attained, the process of irrigation may be undertaken in the following manner :

When the descent cannot be determined with tolerable precision by the eye, an accurate level of the ground must be taken, and the most elevated part compared with the height of the stream to be employed. The instrument used for

this purpose, is called a *water-level;* and, as the common machines are but imperfectly adapted to the purpose, we have subjoined the following representation of a simple [American] implement for taking levels.



It consists of two legs of common deal, A and B, about twelve feet in length, which are joined together at the top, and connected below by a cross bar, as above delineated. From the angle at the top, a plummet C, is suspended by a small cord; which, when a mark is made in the middle of the connecting bar, and the two legs are perfectly straight, will strike such mark, so that the level may be easily ascertained.

In the practical use of this instrument, a wooden pin, on which one of the legs of the frame may rest, is to be driven into the ground at the level of the water, where the irrigation is intended to commence. The other leg is then to be brought round, till it touch the ground, on a level with the top of such pin, when another is to be driven in. After the level has in this manner been perfectly adjusted, the last mentioned pin is to be employed as a rest for one foot, and the other turned about, till the level is found in the same manner. Thus, the precise direction which the stream should take will at once be discovered, without any trouble, or incurring any additional expense by digging through the heights or filling up cavities.

The level being taken as directed, a wide ditch is to be cut as near to the dam as possible, that the water may be conveyed to the highest part of the meadow; the sides and banks of the ditch being uniformly kept at an equal height, and elevated about three inches above the surface. Where the meadow is extensive, and the soil uneven, it will be necessary to have three works or dams in different directions, each of which should be five feet in width, if the meadow contain fifteen acres; and the highest part be the most distant from the stream. A ditch, ten feet wide, and three in depth, will, in general, be fully adequate to overflow ten acres of land; and if there be three works or dams in a meadow, and *flood-hatches*, or flood-gates, be placed at the mouth of each, when the water is not sufficient to irrigate the whole soil at once, it may be performed at three different periods; by taking out one of the hatches or grates for the space of ten days, at the expiration of which it is to be let down, and the other two taken up alternately for a similar period: thus each division will receive a proper share of water in its turn, and derive from it equal benefit.

Where the fall of the meadow renders it practicable, the bottom of the first work should be made as deep as the bed of the river; because the water in proportion to its depth, will carry a larger or smaller

quantity of mud with it, and consequently fertilize the soil in a more or less effectual manner. Small ditches, or troughs, ought likewise to be cut from the works at right angles, about 12 yards apart from each other, and their breadth should be adequate to the distance to which the water is to be conveyed: thus a trough two feet in width, and one foot deep, will irrigate a surface twelve yards wide, and forty feet in length.

It will, however, be requisite to provide the ditches with occasional flood-gates or sluices, especially when the water is rapid, in order to keep it sufficiently high to flow through the perforations in the gates, or over the sides. Between every second trough, a drain is to be cut at equal distances in a parallel direction, and of a proper depth for receiving all the water which overflows the adjacent lands, and conducting it to the principal drain with such rapidity, as to keep the whole stream in constant motion. For, if it be suffered to stagnate, it will be productive of the worst consequences; as the turf would become rotten, the soil be soaked without being ameliorated, and the land produce only coarse grass, rushes, or other aquatic weeds.

Where the meadows are cold, flat, and swampy, the width of the bed, that is, of the intermediate space between the trough and drain, ought never to exceed six yards. In such cases, the land cannot be too much intersected, especially when there is an abundant supply of water. The fall of the bed in every meadow ought to be in the proportion of one inch to each foot; for a rapid current always contributes to produce fine and sweet herbage; but the water ought never to flow more than two inches, nor less than one inch deep, except during the summer months.

Such is the method of irrigation practised in Gloucestershire, and likewise, with very few variations, in the counties of Wilts, Dorset, Cambridge, Hants, &c. Its advantages, indeed, are so important that, we trust, no rational agriculturist will hesitate to adopt the practice of floating land throughout Britain, in every situation where a command of water can be obtained. Common meadows are not only enriched, but those of a swampy nature are consolidated by means of the mud conveyed on them. They are also protected from the effects of frosts by the flowing water, or by the ice when it is frozen; hence the roots of grass remain unaffected by the cold, and excellent crops are thus produced so early, as to be of infinite service for spring food, before the natural grass appears.

By irrigation, good pasturage may be procured in the beginning of March; and, if the season be mild, much earlier. This crop is particularly excellent for feeding such cattle as have been *hardly* wintered; and so great are the benefits attending the flooding of lands, that the farmers of Gloucestershire are enabled to commence the making of cheese, at least *one month* earlier than those who do not possess the same opportunity. The utility of watering land is still farther evinced by this circumstance, that from the great forwardness of grass, the feeding between the months of March and May is worth one guinea per acre; in June one acre will yield two tons of hay; and

the *after-grass* may always be estimated at twenty shillings, whether the summer be wet or dry.

Land may be floated at any period of the year. In the months of December and January, the chief care consists in keeping the soil sheltered by the water from the severity of frosty nights. It will, however, be necessary to expose the surface to the air every ten days, or fortnight, during the winter, by laying it as dry as possible for a few days; and to discontinue the flooding, whenever the land is covered with a sheet of ice.

In February, greater attention is required; for, if the water be suffered to flow over the meadow for several days in succession, a white scum will be generated, which is very pernicious to the grass; and, if the water be drawn off, and the land exposed to a severe frosty night, without being previously dried for a whole day, the greater part of the tender plants will be totally destroyed.

In the beginning of March, the grass on well-flooded meadows will, in general, be so forward as to furnish abundant pasturage; when the water should be drained for the space of a week, that the soil may become firm, before heavy cattle be allowed to graze on such land: these, however, if the season be cold, ought to be supplied with a little hay every night, during the first week.

In the month of April, the grass may be eaten down closely; but no cattle should be turned in later; as otherwise the crop of hay will be much impaired; the grass become soft or woolly; and consequently its value be considerably diminished.

In the beginning of May, the water is again thrown over the soil for a few days, in order to moisten it; but the practice ought on no account to be continued during the summer; for it has an unfavourable effect on the *after-math;* and produces in sheep fed on it, the disorder called the *rot.*

Many other advantages arise from irrigation; but, as our limits admit only of giving an outline, we refer those readers who are desirous to acquire farther information relative to this interesting branch of rural economy, to Mr. G. Boswell's *Treatise on Watering Meadows*, &c. (8vo. 2*s*. 6*d*. 1780), in which the necessary implements, and terms employed in irrigation, are explained and illustrated with engravings; as likewise to Mr. Wright's *Art of Floating Land*, &c. (2d edit. 8vo. Hatchard, 1799, pp. 95, 3*s*. 6*d*.); where the subject is perspicuously treated, and objections are ably answered.

[The advantages of irrigation are well understood by the farmers of Pennsylvania, and cărefully practised by all who have water at command. Contrivances are in some instances also made for this invaluable purpose, which are highly ingenious, and deserve to be generally followed. The one by Mr. Witmer, on the Lancaster road, near Conastogoe creek, shall be particularly described under the article Water.

Dr. W. speaks of the irrigation of England; but all the attempts of that country, are the mill-dams of school-boys, when compared with the great, the *noble executions* of the inhabitants of France and Spain. Arthur Young speaks in

high terms of the prodigious exertions of the inhabitants of Languedoc and Provence, to irrigate their lands. In Spain, the *Norias*, or walled-mounds to hold water, excite the astonishment of the traveller; and such a quantity do some of them hold, that serious consequences sometimes attend a breach. The city of Larca, in the province of Murcia in Spain, was last year inundated by the quantity of water reserved in a *Noria*, upon a neighbouring mountain. SIMONDE, in his late and excellent account of the agriculture of Tuscany, (*Geneva*, 1801,) also details the exertions of the farmers and gardeners of the fertile *Val de Nievole*, in irrigation, which are worthy of attention..... Col. TATHAM's late work, entitled "*National Irrigation*," (London, 1801), has fully and ably treated the subject, and detailed the various modes pursued in England, America, and Spain, and gives some plates, which may be usefully consulted.]

IRRITABILITY, denotes that essential property of animals, in consequence of which their fibres, on being touched, contract or become short, in a greater or less degree.

Chemists have lately endeavoured to shew, that all animal and vegetable irritability originates from the *oxygen*, which is inhaled by the lungs, or respired by the leaves, or absorbed by the roots. And as respiration is every minute requisite to the support of animal life, Dr. DARWIN conjectures that something immediately necessary to their existence, is acquired by the lungs of animals from the atmosphere, rather than from the food they digest; and that this nameless something, perhaps oxygen, is mixed with the blood, and again separated from it by the spinal marrow, after having undergone certain changes in the course of its circulation, or secretion. In a similar manner, he considers it as probable that the spirit of vegetation may be derived from that source, namely, the uncombined oxygen of the air, which is respired by the upper surfaces of the leaves, and not from that which is absorbed by roots, in a more combined state: farther, that this oxygen is again separated from the juices by the *sensorium*, or brain, of each individual bud, after having undergone some change in its passages through the secretory vessels.

A long-continued, unusual, or unnatural stimulation of vegetable fibres, by an increase of heat, exhausts the spirit of vegetation: hence a slighter degree of cold will destroy such fibres; because, after having been excited for a considerable time by a more powerful stimulus, they will cease to act on the application of one that is weaker, so that in consequence of hot days, tender plants are more liable to perish from the coldness of the night. For this reason, gardeners in the more northern climates, shelter both the flowers of apricots, and the tender vegetables, during the spring-frosts, from the meridian sun, as well as from the destructive cold of the night, which is generally the most intense about one hour before sun-rise.

In the hot days of the month of June, 1798, Dr. DARWIN twice observed several rows of garden-beans to become quite sickly; and some of them even died in consequence of being irrigated for one or two hours with water from an adjoining canal. This circumstance he attributes to the sudden application of cold, after the plants had

been greatly enfeebled, and deprived of their irritability by the excessive heat of the season, rather than to the too copious watering of the dry soil. Some vegetables, however, such as strawberries, onions, &c. which were equally exhausted, are less liable to be thus injured, and even receive benefit from occasional irrigation in dry and sultry weather.

On the contrary, the spirit of vegetation acquires additional vigour, if plants have been exposed for a considerable time to a less than usual degree of heat: but, if they be suddenly removed from a cold to a warm place, they will experience a similar fate with those hapless persons, to whose frozen limbs sudden heat was imprudently applied: thus, too great increase of action occasions inflammation, which is generally succeeded by mortification and death. This fact has been ascertained and confirmed by the experiments of M. Van Uslar, who kept two species of the spurge, or wartwort, namely, the *Euphorbia Peplus*, and *Esula*, L. secluded from the light and heat, with a view to render them more irritable: on exposing these plants afterwards to a meridian sun they became gangrenous, and in a short time decayed.

The increased, or diminished, degree of irritability in plants, is by Dr. Darwin attributed to their previous habits, with respect to the stimulus of greater or less heat. Thus, the periods at which vegetables thrive in the spring, appear to be greatly influenced by their acquired habits, as well as by their present sensibility to heat: hence potatoes will germinate in a much cooler temperature during the spring than in autumn; hence also, the vernal months are the most favourable to the process of making good malt; because the barley will then sprout with a less degree of heat than at any other season.

The irritability of plants has been discovered to be greater in the morning than at noon, and less in the evening than at mid-day; though it is considerably augmented during cool and rainy weather. In a similar manner, the limbs of animals acquire a greater sensibility of heat, after having been exposed to the cold: thus, the hands, after immersing them for a short time in snow, glow with warmth on entering the house;....and the late celebrated Spallanzani observed several animals and insects, that conceal themselves under ground in a torpid state during the winter, and enjoy the genial warmth of the spring, again to disappear at a season when the heat of the atmosphere was much higher than on their first emerging from their subterraneous abode.

From these considerations, Dr. Darwin infers, that such plants as are sheltered in a warm room, during the winter, ought to be occasionally exposed to a cooler atmosphere, in order to increase their irritability; otherwise their growth in the succeeding spring will be much retarded. For the same reason, the continual vicissitudes of the air and weather are essentially necessary to mankind; as the frequent changes of heat and cold have an obvious tendency to preserve or restore their irritability, and consequently the activity of the system. Hence not only the health and energy of men are more conspicuous in our variable climate, but their longevity is comparatively greater than on those tropical continents, which experience both a more considerable degree

of heat, and a more steady atmosphere.

Ischury. See Urine.

ISINGLASS, or *Ichthyocolla*, a preparation from different species of a Russian fish, called sturgeon, of which we have given some account in the article Caviare. It may also be produced from the air-bladders of the cod, or *gadus*, as well as from those of other fish inhabiting fresh waters.

The method of making isinglass was for ages kept a secret with the Russians, but has lately been discovered. We extract the following process from the 63d vol. of the *Philosophical Transactions*: First, the sinewy parts of the fish are boiled in water, till they are dissolved; then the viscid liquor is strained, and suffered to cool..... When cold, the fat is carefully taken off, the liquor again boiled to a due consistence, then cut in pieces and rolled into a semi-circular twist, in which state they are suspended on a string, till carefully dried.

The sounds or air-bladders of fresh-water fish, in general, are the most transparent, flexible, and delicate substances, and consequently furnish the finest isinglass. But the intestines and *peritoneum* of the fish constitute inferior sorts of this article, denominated *book*, and ordinary *staple*. The *belugas*, being the largest and most plentiful fish in the Russian rivers, yield the greatest quantity of this animal glue, which, on account of its strength, is preferred to all other kinds.

Isinglass is most successfully prepared in the summer; as frost changes its colour, deprives it of weight, and impairs its gelatinous principle; but the forms into which it is twisted by the Russians are useless, and frequently injurious to its native qualities. These peculiar shapes were probably adopted with a view to conceal the real substance, and thus to preserve the monopoly.

The Newfoundland and Iceland fishermen split open the fish, as soon as they are taken, and throw the back bones, with the sounds annexed, into a heap; but, before putrefaction commences, the sounds are cut out, washed and salted for use. In performing this operation, the best, namely, the intercostal parts, are left behind....the Iceland fishermen are so sensible of this circumstance, that they beat the bone upon a block with a thick stick, till the *pockets* come out easily, so that they preserve the sound entire. This isinglass is dried upon nets in the open air, and resolves into fining like that of Russian manufacture, in sub-acid liquors, such as stale beer, cyder, old hock, &c. while in equal quantities, it produces similar effects upon turbid liquors, except that it falls sooner and closer to the bottom of the vessel; though foreign isinglass, on account of the greater tenacity of its native mucilage, retains the power of fining preferably in warm weather.

With respect to the very extensive use that is made of isinglass by brewers, and wine-merchants, we have already expressed our disapprobation, under the head of Clarification, and also recommended proper substitutes, especially as H. Jackson informs us, in his *Essays on British Isinglass*, published about the year 1765, that its yearly consumption in the brewery was *then* calculated at 25 tons weight, and that 40,000*l*. annually

are paid for this article to the Russians. Hence it is sincerely to be wished, that this importation may be entirely superceded.

[This wish may be well applied to the United States, as our rivers abound with sturgeon, and the use of isinglass is yearly increasing.]

The finest and most transparent sorts of isinglass are consumed in making mock-pearls, and in stiffening linens, silks, gauzes, &c.... It may likewise be reduced to a jelly, as it dissolves in alkaline liquors; and even cold lime-water converts it into a pulpy mass. Although such preparation would be extremely detrimental to health in fining liquors, yet it may be usefully employed for another purpose; because, on mixing this jelly with compositions of plaster, lime, &c. for ornamenting walls exposed to vicissitudes of weather, it forms a firm and durable cement; and, if worked up with common mortar, it soon acquires the hardness of bricks. With this intention, however, it is more conveniently prepared by dissolving it in cold water, acidulated with oil of vitriol: thus, the acid quits the jelly, and forms with the lime a *selenitic* mass; while the jelly, being deprived of part of its moisture, speedily dries, and hardens into a firm body; whence its superior strength and durability may be easily explained.

In a medicinal view, isinglass is but seldom employed; though it may with advantage be used in violent bleedings from the nose, by introducing into the nostril a pessary made of soft linen, and dipped in a solution of this glue, prepared in equal parts of spirit of wine and water. Isinglass also forms a principal ingredient in *sticking-plaster*; and when boiled in fresh milk to the consistence of a strong jelly, it affords a very nourishing food to invalids; though it should be eaten with precaution by those who possess a weak stomach, or digest slowly; as it has a great tendency to turn rancid and putrid.

ISSUES, are small artificial apertures or ulcers in the muscular parts of the body, for the purpose of draining superfluous moisture, or of giving vent to some noxious humours.

Issues are usually made in the arms, legs, or back, either by caustics, or by incision. They are chiefly applied in disorders of the head, eyes, ears, teeth, &c. which are thus relieved, and frequently cured. Inveterate complaints generally require two or more issues to produce any considerable effect, namely, one in each arm, or on the arm and leg of one side of the body.

Artificial ulcers have been much recommended to the consumptive and asthmatic, though we doubt their efficacy when the patient's strength is already exhausted..... They have, nevertheless, often been found useful in cases of confirmed melancholy, when placed near the spine, as the unhappy victim of that disorder can seldom be induced to take any internal remedies. The discharge from these orifices may be promoted by the application of issue pease, and by dressing them with mild blistering ointment.

In order to close an issue, it is sufficient to discontinue the pea; but in case any proud flesh should arise, it may be removed by strewing on it finely powdered loaf-sugar, or burnt alum: after which the wound will speedily heal, if it be properly dressed.

ITCH, a cutaneous affection, in which the skin is covered with small watery pustules, that appear first on the wrist, or between the fingers, then upon the arms, legs, &c. where they are accompanied with an intolerable irritating sensation.

The itch is contagious, but seldom prevails where due attention is paid to cleanliness, fresh air, and wholesome food. Unless it be improperly treated, it is in itself not a dangerous disease: but if it be too long neglected, the whole humours become corrupted; and if it be suddenly suppressed, without proper evacuations, it is apt to occasion fevers, inflammations, pulmonary consumptions, &c. Hence the extreme absurdity of having recourse to ointments which profess to cure it in a certain number of days, or even hours: such imposition should be punished by the magistrate.

When the patient is of a gross habit of body, it will be necessary first to administer one or two brisk laxatives, before he can with safety resort to the tepid bath. The parts affected may next be rubbed alternately, every second day, one half of the body, with an ointment consisting of two ounces of flour of sulphur; two drams of crude sal ammoniac, finely pulverized; and four ounces of hog's-lard, or fresh butter. To this composition may occasionally be added a small portion of the essence of lemons, by which the disagreeable smell of the sulphur will be greatly suppressed.

During this treatment, the patient ought to keep the body gently open, by taking every morning and evening from ten to fifteen grains of the flour of sulphur in honey, treacle, or new milk. The same clothes ought to be worn in the whole course of the disorder, excepting the linen, and when a cure is effected, the former should by no means be touched, till they have been properly fumigated with sulphur, as otherwise the contagion will again be communicated.

There is another species, called the *dry*, or *malignant itch*, which generally arises from the scurvy, and is very difficult to eradicate. In this case, the liberal use of antiscorbutics, and a vegetable diet, are of equal importance. A strong decoction of tobacco has often been found an efficacious external application. Mercurial ointments have likewise been employed with advantage, but their use requires great circumspection, as it is absolutely necessary to keep the bowels regular, by taking the mildest laxatives, and to guard against cold or catarrhs.

A new remedy for this loathsome affection, has lately been discovered by M. Grille. He had observed that persons employed in the manganese-mines, of Macon, in France, were not liable to this cutaneous disease; and that the neighbouring workmen, when attacked by the itch, were accustomed to resort to these mines, with a view to be cured of their complaint: thus, the tormenting irritation speedily ceased; the eruption disappeared; and the skin became perfectly sound.

Hence, M. Grille was led to conjecture, that *manganese* might be employed as a remedy for the itch. He therefore formed 6 parts of this semi-metal in a pulverized state, and 16 parts of fresh hog's-lard, into an unguent: several persons troubled with this disease were

directed to rub such ointment over their bodies; at the same time, the usual medicines for opening the bowels, were administered; and the malady was, in a few days, completely removed.

ITCH, a distemper in *cattle*, which is either occasioned by foul litter, and inattention to the skin of these useful animals, or is communicated from others; though it sometimes arises from a disordered state of the body. Prof. BRADLEY directs the infected creature to be well washed with its own urine previously warmed, and mixed with stale salt butter.

JUICE, denotes the sap of vegetables, or the fluids of animals. See BLOOD, PLANTS, SAP, &c.

The juices of several plants and fruits are expressed with a view to obtain their essential salts, and for various medicinal purposes: they are used either without further preparation, or converted into syrups and extracts. Such juices are generally obtained by simply bruising the plant in a marble mortar, and then submitting the pulp to a press: some vegetables, however, require the addition of water in the mortar, to express their juice with greater facility. The sap of most antiscorbutic plants, abounding with saline volatile principles, may be disposed to filtration, merely by pouring it in close bottles, and immersing them in boiling water: thus, the saline and volatile particles, in which their medicinal virtues chiefly consist, may be easily preserved. See FILTRATION.

Fermentation is another method of clarifying juices that are susceptible of it; for all liquors which have undergone that process, spontaneously become pellucid....See FERMENTATION.

Most vegetable juices coagulate, when exposed to the air, whether they are extracted from the plant by wounds, or flow from it without any external injury: in the latter case, however, it is generally the effect of a disease in the plant, either from a species of canker, or some other internal cause.

Different parts of the same plant often yield juices of opposite qualities. Thus, the sap in the root of the cow-parsnip is of a yellow colour; while that obtained from its stalk is white. The wild or strong scented lettuce, affords the greatest abundance of milky juice, of any known British plant. On wounding the stalk with a knife, there exudes a white ropy liquor; but, if an incision be made at the top of the stalks, a purple-tinged sap appears, as if cream had been sprinkled over it with a few drops of red wine. In a short time, it acquires a deeper purple, and thickens so, that finally a separation takes place, when the watery part floats on the surface......See LETTUCE.

JULEP, a convenient form of medicines, which require no decoction, and are mixed up with syrup or sugar, in order to dilute them properly, or cover their pungency.

Acid julep consists of 3 drams of weak vitriolic acid, 3 ounces of simple syrup, and two pounds of spring-water. These ingredients are to be gradually mixed and the whole carefully strained. See VITRIOLIC acid.

Amber julep: Let two drams of tincture of amber, and half an ounce of refined sugar, be mixed with 6 ounces of spring water, and strained in the manner above-mentioned. Under this form, the tinc-

ture of amber is rendered an agreeable medicine, which may be substituted for the amber itself, in nervous affections, &c. for which it is sometimes prescribed.

Æther julep is composed of two scruples of pure vitriolic æther, 6 oz. of spring water, and half an oz. of refined sugar, which ingredients are to be mixed and strained. In spasmodic affections, this preparation is often given with advantage, in repeated draughts of about half a tea-cupful every hour, or oftener.

Saline julep, is a mixture of 3 drams of purified pot-ash and half a pound of water; to which are to be added, one ounce of the syrup of black currants, and half a pound of lemon-juice; or such a quantity of the latter as will be sufficient to saturate the alkali. This compound is often used in febrile diseases, by taking two or three table-spoonfuls every hour, in order to promote a slight perspiration. It also increases the secretion of urine, and is frequently employed to restrain vomiting.

JUNIPER-TREE, or *Juniperus* L. a native shrub, comprising several species; of which the principal is the *Juniperus communis*, or Common Juniper-tree: it grows in many parts of Britain, upon dry, barren commons; on hills, or in vallies, in open sandy plains, or in moist and close woods, where it generally continues a low shrub: but, if planted in a good soil, it will attain the height of 15 or 16 feet, and produce numerous branches.

The juniper-tree may be propagated by the berries, if they can be procured in a ripe state. It is remarkable, that no grass will grow beneath this shrub; though the latter is said to be destroyed by the meadow-oat.

Juniper-berries possess a strong, not unpleasant smell; and a warm, pungent, sweet taste; which, on chewing, or previously well bruising them, is succeeded by a bitterish flavour. They require two years before they ripen, and yield, on expression, a rich, sweet, aromatic juice, bearing some resemblance to the taste of honey. These berries are useful carminatives; for which purposes a spirituous water, and an essential oil, are prepared from them. The Swedes eat them for breakfast, in the form of a conserve....In Germany, they are frequently used as a culinary spice, and especially for imparting their flavour to *sauer-kraut*. The spirit impregnated with the essential oil of this fruit, is known by the name of Gin, to which we refer.

According to Hoffman, a *rob* is prepared of the liquor remaining after the distillation of the oil: it is passed through a strainer, and gently exhaled to a due consistence. This he recommends as a medicine of great efficacy, in cases of impaired digestion and debility of the intestines; it is also very serviceable to aged persons, labouring under diseases of the urinary passages. The rob is of a balsamic sweet taste, somewhat bitter, accordingly as the seeds have been more or less bruised. One of the best forms, however, is a simple watery infusion of the berries, or the tops with the addition of a small quantity of gin: thus, a very useful medicine is obtained for dropsical patients. Linnæus informs us, that the Laplanders are accustomed to drink such infusions as substitutes for tea and coffee.

The oil of juniper, when mixed with that of nuts, makes an excellent varnish for pictures, wood-work, and for preserving iron from rust.

The wood of the juniper-tree is of a reddish colour, very hard and durable: it is employed in marquetry and veneering; making cups, cabinets, &c. while the bark may be manufactured into ropes. The charcoal made from this wood affords the most durable heat, so that live embers are said to have been found in the ashes, after having been covered for 12 months. The resin of this plant (gum SANDARACH,) when powdered and rubbed into paper, is frequently used under the name of *pounce*...... Thrushes and grouse feed on the juniper-berries, and disseminate the seed in their dung. The sprouts are eaten by horses, sheep, and goats.

In the "*Transactions of the Economical society of Petersburgh*, Mr. ALOPAEUS has published the following facts relative to the more extensive utility of the juniper-tree in Finland.

1. The water used for brewing malt-liquors, is previously boiled with juniper-twigs; which are believed to improve both the salubrity and flavour of the beer.

2. The leaves are employed for fumigating houses, with a view to correct foul air, or expel pernicious vapours.

3. Milk-vessels are preferably made of juniper wood, which is supposed to contribute to the preservation of milk in a sweet state, and to render it more palatable.... When other woods are used for such vessels, they are, for the same purposes, washed with water in which juniper-twigs have been boiled.

4. Warm decoctions of this shrub are frequently given to cows, and sometimes to sheep; in order to enrich the quality, and increase the quantity, of their milk.

Lastly, juniper-berries are roasted, ground, and prepared in the manner of coffee, for which they are frequently substituted; affording an excellent palliative in calculous and gouty complaints. From these berries may also be brewed a cheap, wholesome, and well-flavoured beer, by the following process, which has but lately become generally known in Sweden: Let 30 lbs. of clean juniper-berries be pounded in a mortar (we suppose, without bruising the stones, and be put in a common mash tub, together with 2½ buckets of cold water; suffering the whole to stand 42 hours. When the juice of the berries is sufficiently extracted, the liquor must be drawn off, and boiled in a copper, being carefully skimmed during the ebullition. A due portion of hops is then to be boiled with a little of the wort; incorporated with the whole; and, as soon as it becomes lukewarm, the yeast ought to be added in the usual manner. When the fermentation ceases, the beer should be poured into a barrel containing a little isinglass; and carefully closed with a bung. Such beverage is very salubrious and aromatic; but as it ferments more tardily than common malt liquor, it is apt to become sour: hence, M. ALOPAEUS advises only a small quantity to be brewed at a time.

IVORY, the tooth or tusk of an

elephant, growing on each side of his trunk, and somewhat resembling the shape of a horn.

Ivory is much esteemed for its remarkable whiteness, its polish and beautiful grain. DIOSCORIDES asserts, that if this substance be boiled with the root of mandragoras, for six hours, it may be rendered soft and flexible. By steeping small pieces of ivory in vinegar or any other acid, they become ductile, and may be preserved in that state for a considerable time, by keeping them in common water. This hard substance may also be softened and whitened, by immersing it in a hot decoction made of red sage leaves, in double-distilled white-wine vinegar, with the addition of a little quick-lime. For removing spots, the ivory should be laid in unslacked lime, and a small portion of water poured on it,lest the heat be too intense, and the ivory scale, or become brittle. Others discharge the stains by merely steeping it for some time in strong lime-water.

Ivory may be dyed *green*, either in a solution of copper or verdigrease in aqua-fortis; or by grinding together two parts of verdigrease and one of sal ammoniac, and dissolving them in strong white-wine vinegar. Farther, by employing four ounces of aqua regia and one ounce of sal ammoniac, a fine *purple* colour will be the result.

Ivory, bone, horn, and other solid parts of animals, may be stained *yellow*, by previously boiling them in a solution of one pound of alum in two quarts of water; then immersing them for half an hour in a liquor prepared by boiling half a pound of turmeric in a gallon of water, till it be reduced to three quarts, and afterwards plunging the coloured substance into alum water. All bony matters may also be stained *blue*: they are first to be tinged with green, then dipped in a strong and hot solution of pearl-ashes. See also BONES, TORTOISE-SHELL, and WOOD.

Ivory may be prepared as a ground for miniature-painting, by cleansing the leaves or plates, and rubbing them over with the juice of garlic. This method is preferably recommended for removing its greasy quality, which prevents the colours from fixing on the ground, and is said to be more useful than either soap or ox-gall.

With respect to the medicinal properties of ivory, its shavings, like those of HARTSHORN, may, by boiling, be converted into a jelly, and possess similar restorative virtues.

IVORY-BLACK........See vol. i. p. 295.

IVY, the COMMON, or *Hedera Helix*, L. a native plant growing in woods, hedges, and about old buildings: it flowers in the month of October.

This plant was first brought to Europe from Canada, and has been long cultivated in the British gardens, chiefly for the purpose of covering walls or buildings. It shoots almost 20 feet in one year, and gradually extends to the top of the highest building. It is easily propagated in autumn, by its trailing branches; and will thrive in almost any soil or situation, so that in the following October it is fit to be transplanted to those places where it is destined to remain.

The leaves of ivy possess a nauseous taste, though in Germany they are employed as a specific in the atrophy of children. Among

the lower class of people in England, they are applied to issues; and the Scotch Highlanders prepare an ointment from the leaves, which is much esteemed for the cure of burns. The berries are of a fine gold colour, and possess a slight degree of acidity: when swallowed by children or adults, they occasion vomiting, diarrhœa, and profuse sweating. The roots of this plant are employed by leather cutters to whet their knives. BOHMER informs us, that both the leaves and branches are useful in tanning. Apricots and peaches, when covered with ivy during the month of February, have been observed to bear abundant fruit....... Horses and sheep eat the common ivy, but it is totally refused by cows and goats.

K

KALE, the Sea, or *Crambe*, L. a genus of perennial plants comprising three species one of which is a native of Britain, namely, the *maritima*, Cliff-kale, Sea-cabbage, or Sea Colewort. It grows on sandy soils, near the sea-coast, and flowers in the months of May and June. This plant is relished by horses, cows, goats, hogs, and sheep. It's young and tender leaves are boiled and eaten as cabbage; but, when full grown, they frequently occasion giddiness.

The sea-kale is cultivated in many gardens as an esculent vegetable. It is also reared in pleasure-grounds, as a flowering perennial; because the stalks divide into fine branching heads of flowers.... For either purpose it is propagated by seed, sown in autumn or spring in any common light soil, in which the plants are intended to remain. At the end of two years, they will produce shoots fit for use, and multiply exceedingly by the roots, which continue for many seasons.

[The proper directions for cultivating sea-kale, were improperly given by the author Dr. W. under the head CABBAGE. See vol. ii. p. 467.]

KALENDAR, or CALENDAR, denotes either the distribution of time, accommodated to the purposes of life; or a table or almanack, comprising the order of days, weeks, months, &c.

There are various systems of chronological computation, according to the different forms of the year and the division of time adopted in particular countries; such as the Julian, Gregorian, and the new French kalendar.

The *Julian* kalendar received its name from JULIUS CÆSAR, the reformer of the old Roman kalendar, and is divided into periods comprising four years; the first

three of which are called *common*, and consist of 365 days; the fourth has received the appellation of *bissextile*, or leap-year, and contains 366 days, on account of the six hours, which in the space of four years form a day, within a few minutes, and thus in the course of 134 years, render it necessary to subtract an intercalary day.

For this reason, Pope GREGORY XIII, with the advice of able mathematicians, appointed that the hundredth year of each century should have no bissextile, excepting in every fourth century, on account of the deficiency of eleven minutes in the six hours of which a bissextile consists.

This reformation, or the *new style*, as it is now termed, commenced on the 4th of October, 1582, when ten days were omitted in the old kalendar; but that change was not introduced into Britain till it was enacted by the 24th GEO. II. c. 23, that the Gregorian computation should be adopted; and it accordingly took place in the year 1752.

The kalendar at present used by the French, was invented by FABRE D'EGLANTINE, during the late revolution. It commences with the autumnal equinox, and is divided into twelve months, each of which contains 30 days, and three decades, or periods of ten days: thus, a decade is a day of rest, similar to our Sunday. To the 12th month, or Fructidor, are added five supernumerary days called *sanculottides*: and that the reader may form some idea of the new French kalendar, we have annexed the following tables, in which the new and old methods of computation are placed in parallel lines:

Years of the Republic.	Gregorian Year.	Commencement of the French Year.	September.
10	1801—02	1801	23
11	1802—03	1802 S.	23
12	1803—04 B.	1803	24
13	1804—05	1804 B.	23
14	1805—06	1805	23
15	1806—07	1806 S.	23
16	1807—08 B.	1807	24
17	1808—09	1808 B.	23
18	1809—10	1809	23
19	1810—11	1810	23
20	1811—12 B.	1811 S.	23

B. Signifies *Bissextile*, or Leap-Year...S. *Sextile*, or French Leap-Year.

By means of the next Table, the first day of each Month of the New French Kalendar, is made to correspond with that of the common Kalendar.

1. *Vendemaire*, or Autumnal Month.	1. *Brumaire*, or Hazy Month.	1. *Frimaire*, or Hoar-frost Month.	1. *Nivose*, or Snow Month.	1. *Pluviose*, or Rain Month.	1. *Ventose*, or Wind Month.
22 Septemb.	22 October	21 Novem.	21 Decem.	20 January	19 Feb.
23 ——	23 ——	22 ——	22 ——	21 ——	20 ——
24 ——	24 ——	23 ——	23 ——	22 ——	21 ——

1. *Germinal*, or Germinating Month.	1. *Floreal*, or Flower Month.	1. *Prairial*, or Meadow Month.	1. *Messidor*, or Harvest Month.	1. *Thermidor*, or Hot Month.	1. *Fructidor*, or Fruit Month.
21 March*	20 April *	20 May *	19 June *	19 July *	18 Aug. *
22 —— *	21 —— *	21 —— *	20 —— *	20 —— *	19 —— *
23 —— *	22 —— *	22 —— *	21 —— *	21 —— *	20 —— *

First Intercalery Day
17 Septem. *
18 —— *
19 —— *

* When a Gregorian Leap-Year occurs, one day must be subtracted from all those days in the year which are marked with an asterisk.

In the following Table, the first day of each Month of the common Kalendar is arranged according to the first day of the French Kalendar; and it deserves to be remarked, that when a Leap-Year occurs, one day must be superadded to each of the following days.

Commencement of the year in the foregoing Gregorian year.	1 January	1 February	1 March	1 April
22 September	12 *Nivose*	13 *Pluviose*	11 *Ventose*	12 *Germinal*
23 ————	11 ——	12 ——	10 ——	11 ——
24 ————	10 ——	11 ——	9 ——	10 ——
	1 May	1 June	1 July	1 August
	12 *Floreal*	13 *Prairial*	13 *Messidor*	14 *Thermid.*
	11 ———	12 ———	12 ———	13 ———
	10 ———	11 ———	11 ———	12 ———
	1 Septemb.	1 October	1 Novemb.	1 December
	15 *Fructid.*	10 *Vendem.*	11 *Brumair.*	11 *Frimaire*
	14 ———	9 ———	10 ———	10 ———
	13 ———	8 ———	9 ———	9 ———

The Monthly Reviewers, in their Journal for March 1797, observe that the new French year appears to astronomers better calculated than our own, because its commencement forms a natural date in both the hemispheres, and its four quarter days coincide very nearly with the solstices and equinoxes. The French months, too, are of equal length; and divided regularly by their decades, without a fraction; by which the remembrance of dates, circumstances, &c. is considerably promoted. In the conclusion of their criticism, however, the Reviewers admit that the names are ill-adapted to the months, which are accommodated only to the climate of Paris: hence they are of opinion that these innovations, as well as those respecting weights and measures, ought to have been reserved for discussion in a congress for general pacification.

[KALMIA, a genus of native plants, of which there are certainly four species, viz. 1. *K. latifolia*, or broad-leaved laurel, winter green, callico tree. This is the largest of all the species, growing to the height of seven or eight feet, and sometimes higher. The wood is hard, compact, and is employed, by turners and joiners, in making work requiring such wood. It also furnishes handles for scythes. The leaves are highly poisonous to horses, but deer, and the pheasant eat them with impunity. They however, when eaten late in the winter by pheasants, once communicated a quality to the flesh of these birds, which occasioned alarming symptoms, in many persons, and the death of others who eat of them, during the latter end of the winter of 1790-91. An account of the fact as recorded by the Editor of this work, may be found in the *New-York Med. Repository*, vol. 1.

2. *K. angustifolia*, narrow leaved, or dwarf-laurel grows on sandy heaths, and dry, poor soils.... Bees collect a deleterious honey from the flowers of both species of this plant, which produces very disagreeable symptoms in those who eat of it; as mentioned under article BEE.

An ingenious experimental inaugural dissertation was published in Philadelphia in 1802, by Dr. THOMAS, upon the above species of Kalmia; from which it appears that the leaves of both abound with resin, but that the last is the most active of the two. From the same dissertation we find, that a decoction of the *K. latifolia*, prepared by putting one ounce of the leaves in eight ounces of water, and boiling it down to four ounces, cured a *diarrhœa* of eight weeks continuance. The dose at first was thirty drops six times a day, but producing vertigo, it was diminished to four times a day. The itch was speedily cured by washing the parts with the decoction.

The Scald head, *Tinea Capitis*, was also cured by anointing the head with an ointment made of the leaves and hog's fat. Dr. BARTON bears testimony of the efficacy of this ointment in the Tinea. See "*Collections for a Materia Medica.*"

3. *K. Glauca* of Aiton.

4. *K. Hirsuta* of Walter. or *K. ciliata* of Bartram. The last is a native of the Southern States.]

KELP, a term used to denote a species of pot-ash, employed in glass manufactories for chrystallizing the *metal*.

Kelp consists of the calcined ashes of the sea-wrack and other

plants growing on the sea-shores, between high and low water-mark. The preparation of this useful article should be commenced in the spring; for, if the burning be delayed till the harvest is far advanced, the rainy season of autumn renders the process more tedious and difficult. To prepare the materials for producing *kelp*, the sea-weeds should be cut with hooks or sickles; but the aspect of the shore, together with the time and rapidity of the tides, should be previously ascertained. If the coast be level, the plants may be speedily conveyed by horses and carts to the place where they are to be dried and burnt. On the contrary, when the shore is rugged, a strong rope should be laid at low water, around the cut grass; and, in order to increase the diameter of this rope, the longest sea-plants ought to be twisted round it. With the returning tide, the whole spot thus surrounded will soon be set afloat, and the cut vegetables may be readily collected; for, as the water advances, they may be gradually dragged towards the shore, by means of the rope serving as a net. To facilitate their removal, one end of the cord should be drawn through a ring, applied to the other end, and tightened so as to contract the plants into a small bulk: thus, they may be easily moved along with the tide. After the herbage has reached the place of its destination, it must be dried in a manner similar to hay; coiled and stacked up for burning; proper care being taken to form the stacks, so as effectually to secure it from the rain.

With respect to the burning or melting of kelp, a process very tedious, and not strictly connected with domestic economy, the inquisitive reader may consult the 12th vol. of the *Repertory of Arts and Manufactures;* where it is minutely described.

KENNEL, or CHANNEL, generally signifies a small cavity or hollow for conducting water through the streets; but, in its present sense, it is peculiarly applied to denote a house or building for the reception of a pack of hounds.

A kennel ought to be situated on an eminence, in a dry situation, and in the vicinity of a brook or running stream. The strictest cleanliness is necessary, both for promoting the health of hounds, and also to preserve their sense sufficiently acute: for this purpose, kennels should be well aired, and strewed with fresh straw, to prevent the mange, or other infectious distemper. Mr. BECKFORD recommends these buildings to be erected in the vicinity of the mansion; and, on their first establishment, to construct them of the requisite capacity; because every subsequent addition impairs their external appearance. Those readers who wish to acquire farther information on the management of the kennel, will meet with amusement in Mr. B.'s *Thoughts on Hunting;* of which, we understand, a new edition will shortly appear.

KERMES-MINERAL, one of the best preparations of antimony, which is so termed from its close resemblance to the insect called Kermes, or *Coccus ilicis*, L. It is prepared by boiling together half a pound of crude antimony reduced to powder, and two pounds of purified pot-ash in eight pints of pure water, for fifteen minutes; stirring the mixture with an iron spatula; and then expeditiously filtering it

while it is hot. The liquor is now suffered to stand in a cool place, where it soon deposits a powder that ought to be repeatedly washed, first with cold, and afterwards with hot water, till it be completely divested of its taste.

This medicine was originally contrived by GLAUBER, whose successor sold the secret of preparing it to the French King; in consequence of which, it was published in 1720. If judiciously administered, kermes-mineral is a compound of great efficacy, on account of its exciting and evacuating properties. According to the quantity that is taken, it will operate either as an emetic, purgative, sudorific, or expectorant; for it is equally attenuating and resolvent, especially in disorders of the breast, proceeding from obstructions. The particular doses of this powder are mentioned in the accounts of the different disorders in which it is recommended; but, in general, *one grain* only is prescribed for adults, to be taken every third or fourth hour.

KEY, a well known instrument employed for opening LOCKS, of which we shall give some account under that article.

KEY also denotes an extensive wharf for the convenience of loading and unloading goods on board of merchantmen. See QUAY.

KIDNEY-VETCH, *Anthyllis*, L. an indigenous biennial plant, comprising several species, of which the *vulneraria*, or Lady's-finger, is the principal: it grows in meadows and pastures, in a chalky or calcareous soil; produces yellow flowers from May to August, and its seeds ripen in October.

In the cultivation of this vegetable, no particular care is necessary, farther than to keep it clean from weeds. It affords excellent pasturage for sheep. LINNÆUS remarks that, when the kidney-vetch grows on a reddish clay soil, the blossoms present a red colour: but, in white clay-land, they are uniformly white.....Although these flowers were formerly celebrated as vulnerary, yet we believe they might be more usefully employed as a dyeing material, and perhaps, as a substitute for *indigo*; because in a dry state, they acquire a *blue* colour. Country people obtain from them a fine yellow dye. The plant is relished by cows and goats.

KIDNIES, in anatomy, are those two viscera which separate the urine of animals. They are situated in the lower part of the cavity of the abdomen, on each side of the vertebræ of the loins, between the last false rib and the hip bones. The right kidney lies beneath the great lobe of the liver; and the left, under the spleen: they are generally about five inches in length, three inches broad, and one inch and a half thick, in adults. Their excretory ducts are called *ureters*, or canals which convey the urine into the bladder.

The kidnies of animals are, in general, tough, acrid, and difficult of digestion: hence they ought not to be eaten by persons of a delicate habit, or of a sedentary life. Those of calves, lambs, and other young animals, may however be used with safety; as they afford a more palatable and congenial food.

INFLAMMATION of the *Kidnies*, or *Nephritis*, a painful affection of these parts, attended with a frequent discharge of water, which is either thin and colourless, or very red; with vomiting, coldness of the extremities, difficulty of breathing,

numbness of the thigh, and other febrile symptoms.

The remote causes of this inflammatory disease are, stony concretions, external contusions, violent or long continued riding, strong diuretic medicines, such as the spirit of turpentine, &c. The more immediate causes, are the same as induce other local inflammations.

Cure : In this, as in similar complaints, bleeding is the first remedy to be resorted to, especially by means of leeches. It will also be advisable to apply cloths immersed in hot water and wrung out, as nearly to the part affected as the patient can bear, and to renew them as often as they grow cool. Emollient clysters are also to be frequently administered ; and the same treatment must be adopted, as has been already pointed out under the article INFLAMMATION.

Should these remedies fail to afford relief, and the numbness of the part affected, together with the other symptoms, continue to increase, a suppuration will immediately ensue. In this disease, the patient must avoid all acrid, sour, and salted provisions, and subsist entirely on mild, mucilaginous vegetables. Butter-milk, if used to a considerable extent, has been found of excellent service, and in some cases, even proved a specific remedy for ulcerated kidneys. Goat's milk, and the balsams of Copaiva, or Canada, have been recommended as eminently useful. Those persons who are liable to frequent returns of inflammation, or obstructions of the kidneys, ought rigidly to abstain from wines, and all ardent spirits, their food should be of the lightest kind, and easy of digestion : they must likewise not attempt to lie on feather-beds, or be covered too warm ; never sleep on their back ; and carefully take daily, though moderate exercise.

KILDERKIN, a liquid measure, consisting of two firkins ; and two kilderkins make a barrel. See FIRKIN.

KILN, a stove used in various manufactures. It also denotes a building for the admission of heat, in order to dry or burn certain materials deposited in such an edifice. See BRICK, MALT, and LIME.

In 1796, a patent was granted to Mr. J. PEPPER, of Newcastle-under-Line, for his invention of a kiln, for the purpose of drying malt or other grain. As, however, the ingenious inventor's plan would be understood only by architects, or builders, the curious reader will resort to the 5th vol. of the *Repertory of Arts*, &c. where it is illustrated with two engravings.

KING-FISHER, or *Alcedo*, L. a genus of birds frequenting every quarter of the world, and comprising numerous species ; the principal of which is the *ispida*, or common king-fisher.

The bird is about the size of a swallow ; of a clumsy shape ; and the bill disproportionately long.... But the great beauty and variety of its plumage amply atone for its inelegant form. The crown of its head, and the coverts of its wings, are of a deep blackish green, spotted with a bright azure tint ; the back and tail exhibit the most resplendent shades : the whole interior side of the body is of an orange cast ; and the tail, consisting of twelve feathers, presents a rich deep blue. When flying, in a bright day, the plumage of this bird exhibits a variety of the most dazzling colours.

The female king-fisher constructs her nest in holes scooped out of the sides of cliffs, to the depth of three feet; and deposits from five to nine eggs, of a semi-transparent white. She begins to lay early in the season, and excludes her first brood about the month of April; as the period of incubation does not exceed twenty days. While she is brooding, the male plentifully supplies her with fish; and, unlike most other birds, the female in that season is muscular and plump.

King-fishers are the most rapacious little animals that skim the deep; and, though of diminutive size, they devour almost incredible numbers of fish. Hence, their flesh is unfit to be eaten; but their beautiful plumage retains its lustre longer than that of any other bird.

KINO, a gummy resinous substance, exuding from incisions made in a tree called *Pau de Sangue*, a native of the inland parts of Africa, but of which there is no botanical account.

From its sensible qualities, and also by its striking a black colour with a solution of green vitriol, this drug is remarkably astringent. It was first recommended by Dr. FOTHERGILL, and is now often prescribed in diarrhœas, fluxes, &c. It affords an extract both in spirits and in water, but is more generally given in the form of a tincture, from one or two tea-spoonfuls, three or four times in 24 hours.

KITCHEN, an apartment or room destined for the dressing of provisions, and preparing them for the table.

In 1794, a patent was granted to Mr. G. STRATTON, for an improved *kitchen-range*, or stove, with an apparatus for the prevention of smoky chimnies. His invention is stated to be an improvement upon fire-places, by which great heat may be obtained from a small fire; by means of flues, connected either with the front, sides, back, or bottom of such grates, as occasion may require: it farther contains a contrivance for the immediate extinguishing of fire in chimnies. We refer the reader for particulars to the specification, given in the first volume of the *Repertory of Arts and Manufactures* where it is illustrated with an engraving.

A patent was likewise granted in 1780, to Mr. BRODIE, for his invention of a *ship's kitchen*, including a stove, hearth, smoke-jack and iron boilers. These contrivances, however ingenious, are not connected with domestic economy; and the curious reader will find them detailed in the 7th vol. of the work before quoted.

[The very great improvements lately made by our countryman Count RUMFORD, in the *Science of Cooking*; deserve a particular notice in an American edition of a work, expressly compiled for the purpose of increasing our knowledge of domestic economy. Hence the Editor has been at the pains to condense the most important matter on the subject, which is diffused through two thick octavo volumes; and also introduce cuts of some of the kitchen utensils, which from the simplicity of their construction, are most liable to meet with approbation in the United States.

Some general observations shall first be made.

1. Count RUMFORD has fully shewn, that, *water just on the point of boiling, is as hot as it can possibly be made in an open vessel*; that

consequently all the fuel used in making it boil with violence, is wasted, without adding a single degree to the heat of the water, or expediting the process of cooking a single instant; and that it is by *heat*, its *intensity*, and duration, that the food is cooked, and not by the boiling*.

2. Food, long and violently boiled, is rendered much less savoury, in consequence of the finer and more volatile parts being carried off in the steam rising therefrom, and is also less nourishing.

3. $26\frac{1}{4}$ lbs, of dry pine wood are required to heat 300 lbs. of water, and 100 lbs. of beef, (both at the temperature of 55) boiling hot, and 3 lbs. more of wood to keep the whole boiling three hours: in all, equal to $\frac{3}{4}$ of a peck of pit coal.

Count RUMFORD objects, 1st, to the kitchen ranges of England, (and he might include with great propriety *our wood-devouring wide-throated chimnies.)* 2. To the iron ovens, and boilers heated by lateral flues, and 3. To smoke-jacks: both of which are creeping into use here just as they are exploded in England!

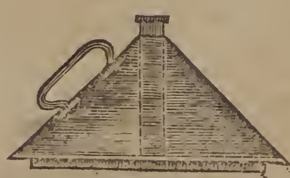
He prefers common jacks, as being less troublesome, less expensive, and not so liable to get out of order, or to make the kitchen smoke, and lays down the following objects to be had in view, in *attempting to improve kitchen fire-places.*

1. In general, the boiler, kettle, and stewpan, should have its separate closed fire-place; its separate grate, on which the fuel must be placed; and separate ash pit, closed by a well fitted door; furnished with a register in the middle of this door, for regulating the admission of air; and a separate canal with a damper, for carrying the smoke into the chimney. The canal may open into the chimney about a foot above the level of the mantle.

2. In the fire-places for all boilers and stewpans, which are more than eight or ten inches in diameter; or which are too large to be easily removed with their contents, *with one hand;* an horizontal opening, just above the level of the grate, must be made, for introducing the fuel into the fire-place: which opening must be nicely closed by a fit stopper, or by a double door. In the fire-places for small stewpans, this opening may be omitted, and the fuel may be introduced through the same opening, into which the stewpan is fitted.

3. All portable boilers and stewpans, should be *circular*, and be suspended by their circular rims. Fixed boilers should be an *oblong square*, to permit the free repairs of flues; and *all* boilers rather *broad* and *shallow*, than narrow and deep.

4. All boilers should have covers, made of tinned iron, of the form of a hollow cone, as in the annexed cut.



* An attention to the regularity of heat is of great consequence, not only in cooking, but also in various arts requiring much heat. The success of many processes depends upon it....*Editor.*

The height of the cone to be one third its diameter; and the bottom closed by a circular plate, or thin sheet of tinned iron; and fitted to the top of the boiler; which is to be completely closed by means of a rim, about two inches wide, and made to enter the boiler, and soldered to the flat sheet of tinned iron, which forms the bottom of the cover. The steam to be carried off by a tube one half inch in diameter, passing through the cover, and projecting $\frac{1}{2}$ an inch above the top, and soldered above and below, in such a manner, that the air in the cone may remain completely confined.

The same fire-place may serve occasionally for several boilers or stewpans. But those used in the same closed fire-place, must be of the same diameter, and of different depths: and have their diameters marked on their handles or brims, or covers; these fire-places also should be marked with the same number: and to guard against mistakes respecting the sizes of utensils, and the fire places to which they belong: the difference of the diameters of two boilers or stewpans should never be less than *one whole inch.*

In some they have been made of 6, 8, 10, 12 and 14 inches in diameter; and $\frac{1}{3}$, $\frac{1}{2}$, and $\frac{2}{3}$ their diameters in depth.

The boilers should be placed near the chimney, and in general, in one range, or rather in one mass of brick work. The distance of fitting up or setting boilers and saucepans, may be taken at a width of a brick or $4\frac{1}{2}$ inches; and the same space allowed for the distance of the side of the boiler, from the outside or fronts of the mass of the brick work.

The readiest way of proceeding in making a plan of the kitchen machinery, is, to form it on the plan of the room; and having settled the places of the boilers, to trace on this plan, a ground plan of the whole; and a sufficient number of sections and elevations should be drawn to shew the situations, forms and dimensions of the fire-places, and of all the other parts of the apparatus.

The ash pits are first to be sunk, the ash doors placed, and the foundations of the brick-work laid.

The separate closed fire-places under iron ovens or roasters, must be made very small, otherwise the cook will make the fire too large: and it is a great fault to overload the fire-place with fuel, especially when the fire is first kindled. The fire-place must be situated directly under the oven or boiler.

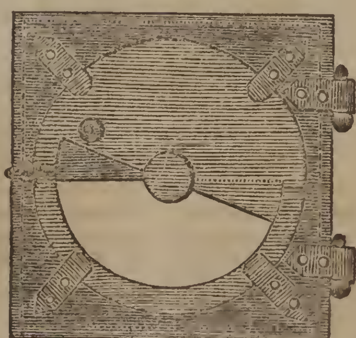
The fuel should be burnt upon a grate in the form of a segment of a hollow sphere, or of a dish, that the solid pieces of the inflamed fuel may fall together in the centre of the fire-place, without any assistance. As to the size of the grate, make it's diameter equal to the diameter of the boiler at the brim.

See the following figures.

When wood is used, it must be cut into lengths of six inches.

When the fire-place is closed on all sides by a wall, and when the opening by which the fuel is introduced, is kept closed ; no air can press in laterally upon the fire ; but yet, when the grate is larger than the heap of burning fuel, which must often be the case, a great quantity of air may insinuate itself by the sides of the grate into the fire-place, without going thro' the fire : but when, instead of an iron grate, a perforated hollow earthen pan is used, by making the bottom of the pan, two, three, or four inches, and making all the air holes point to one common centre, (to the focus or centre of the fire) this *furtive* entrance of cold air into the fire-place, will, in a great measure, be prevented. These holes ought to be smaller above than below, to prevent their being choaked. This evil may be also prevented, when circular hollow iron grates are used ; by *narrowing the fire-place immediately under the grate*, in the form of an inverted, truncated hollow cone, the opening or diameter of which, above, being equal to the internal diameter of the circular rim of the grate, and that below (by which the air rises to enter the fire-place) about *one-third* of that diameter. See the cut p. 413. This opening below, through which the air rises, must be immediately under the centre of the grate, and as near to it as possible : care must be taken, however, that a small space be left between the outside or underside of the iron bars which form the hollow grate, and the inside surface of this inverted hollow cone, in order that the ashes may slide down in the ash pit. These directions are more peculiarly applicable to fire-places of a moderate size.

The construction of the ash pit door with it's register, may be understood from the following figures.



The above is a front view of the door with it's register. The whole is constructed of sheet-iron, except the narrow pieces at the four corners, which hold down in its place the circular plate of the register, and the small circular plate (as large as an half crown) in the centre of the register, which are made of brass, on account of that metal not being so liable to rust as iron.

The above cut represents the plate of sheet-iron, which forms the front of the door, with the holes in it, by which the other parts of the machinery are fixed to it.

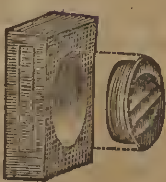
The above represents the circular plate which forms the register. To this plate is fixed a projecting knob, or button, by which it is turned about.

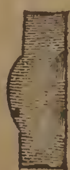
In constructing these register doors, and in general, all iron doors for fire-places, the flat surface of the inside of the door should merely shut down on the front edge of the door frame, or lie against it, touching in all its parts. This

edge, by grinding it on the flat surface of a stone, should be made level to receive it: doors fitted in rabbits or grooves, are troublesome.

When the heat is very intense, the frame of the door should be made of fire stone, [or soap-stone cut edgewise, the necessity of which was stated under article FIRE-PLACE.] And that part of the door exposed to the fire, should be covered, either with a fit piece of fire-stone, fastened to it with clamps of iron; or a sufficient number of strong nails, with long necks and flat heads; or of staples, being driven into that side of the plate of iron which forms the door exposed; that side of it should be covered with a body about two inches thick, of strong clay mixed with a due portion of coarse powder of pounded crucibles; which mass will be held in its place by the heads of the nails, and by the projecting staples. This mass being put on wet, and gently dried, the cracks being carefully filled up as they appear, and the whole well beaten together into a solid mass, will, when properly burned on by the heat of the fire, form a covering, which will effectually defend it from all injury from the fire: and be very lasting.

The contrivance for closing the doors for the introduction of fuel, most approved of, is a tile with a conical hole in its centre, 6 inches in diameter externally, and $5\frac{3}{4}$ inches diameter within, provided with a fit baked earthen stopper. The annexed cuts will give an idea of their forms.





The doors of closed fire-places, if constructed of sheet-iron, must be *double*, or be covered on the outside with a pannel of wood. By a double door, is meant, one door constructed of two sheets or plates of iron, placed parallel to each other; and so constructed, that the air which is between the two plates may be shut up and confined. The plates must not touch except at their edges, in order to their being fastened together: they need not however be more than one inch, or one inch and a half asunder. One of the plates may be quite flat, and the other a little convex. The end of the oven must be made quite flat, or level, so as to be perfectly closed by a flat surface placed against it. The door is that flat surface; and the greatest care must

be taken, that it apply with accuracy, or touch the end of the oven in every part, when pressed against it, to prevent the escape of heated air.

In constructing closed fire-places for kitchens, I have found it to be a good general rule, to make the distance between the fire-place door, and the hither end of the bars of the grate, just equal to the width of the fire-place, measured just above the bars. In fire-places of moderate size, where double doors are used, it will suffice, if the distance from the hinder side of the inner door, to the hither end of the bars, be made equal to the width of a brick, or $4\frac{1}{2}$ inches; but if the door be not double, it is necessary that the length of the passage from the door, into the place occupied by the burning fuel, should be at least six or seven inches.

In setting the iron frame of the door of *all* closed fire-places, care should be taken to mask the metal, by setting the bricks before it in such a manner, that no part of the frame may be seen, (if I may use that expression) by the fire. Otherwise the frame of the door will be heated; its form destroyed by the frequent expansion and contraction of the metal; the frame of the brick-work loosened, and air admitted over the fire, between the frame and the brick-work, and likewise between the frame and its door, which will no longer fit each other.

A good idea of the general plan adopted by Count RUMFORD, in constructing his kitchen apparatus; may be formed from the annexed cut of that of baron LERCHENFIELD at Munich, which the Count acknowledges to be the completest of any he ever caused to be constructed. Every man may accommodate this plan to his own kitchen, and to his own wants.

The mass of brick-work projects into the room, and the smoke is carried off by flues concealed in this brick-work, and in the thick walls of an open chimney fire-place which standing on it, on the farther side of it, where it joins to the side of the room, is built up perpendicularly to the ceiling of the room. At the height of about twelve or fifteen inches above the level of the mantle of this open chimney fire-place, the separate canals for the smoke concealed in its walls, and in the larger canal of this fire-place: which last-mentioned larger canal sloping backwards, ends in a neighbouring chimney, which carries off the smoke through the roof of the house into the atmosphere. The canals are cleansed by means of a strong cylindrical brush, of hog's bristles fixed to a long flexible handle of twisted iron wire.

The above cut shews an horizontal section of the mass of brick work in which the boilers are set, taken at the level of the horizontal flues, that carry off the smoke from the boilers, stew-pans, and sauce-pans, into the vertical canals, which convey it into the chimney. The smoke from three of the principal boilers, situated on the left hand, is carried by separate canals to a circular cavity, over which a large shallow boiler is placed, in which water is heated, (by this smoke), for the use of the kitchen. This boiler has a wooden cover, consisting of three pieces of thin flat board united by two pairs of hinges*.

The five fire-places on the left hand side of the mass of brick work have doors or openings, closed with stoppers, for introducing fuel into these fire-places, and three of these openings are represented in the plan as being closed by their stoppers, while the fourth (that situated on the right hand) is shown open, or without its stopper.

As all the rest of the fire-places, being without any lateral openings, when any fuel is to be introduced, the stew pan or sauce-pan must

* In the Kitchen of the Military Academy at Munich, he added this contrivance. One of the three pieces of flat board forming the cover, is fastened down to the wooden rim of the boiler, by means of two small hooks of iron; and from the middle of this part of the cover, a long tin tube, about $1\frac{1}{4}$ inches in diameter, rises up perpendicularly to the ceiling of the room, and carries off the steam from the boiler out of the kitchen. In the kitchen of Baron L. a steam-tube with a register rises from the ceiling of the room, ends in the open air, and is always opened to clear the room of any vapour.

In the *Public House of Industry* at Munich, the steam was carried up into rooms over the kitchen, where it passed through a spiral worm placed in a cask of cold water, which was thus warmed, and made use of the next day for filling the boilers. That this water might not be cooled during the night, the cask containing it was put into another cask still larger; and the space between the two casks was filled with coal....... [Charcoal or ashes will answer; both these substances being bad conductors of heat......These hints may be very usefully improved, and acted upon, on various occasions in domestic life......*Editor.*]

be removed for a moment for that purpose.

It will be observed, that several of the horizontal canals that carry off the smoke from the boilers, are divided into two branches, which unite at a little distance from their fire-places; this contrivance is very useful, as it occasions the flame to divide under the bottom of the boiler, and to play over every part of it a thin sheet.

The reason why flues were not made under these boilers, was, to render it possible to use occasionally several boilers of different depths in the same fire-place; a convenience of no small importance. Circular flues prevent this convenience, though they economise fuel.

They will be rendered unnecessary, provided that the flame be made to divide under the bottom of the vessel, (which may be done by causing it to enter the horizontal canal by two opposite openings), and provided that this canal be furnished with a good damper, WHICH OUGHT NEVER TO BE OMITTED.

The dotted lines leading from the front of the brick work to the fire-places, shew the position and dimensions of the ash pit.

The whole length of the mass of brick work from A to B is eleven feet, and its width, from A to C, is seven feet four inches. The space it occupies on the ground may be conceived to consist of six equal squares of forty-four inches square each: these two rows being joined to each other by their sides, and forming together a parallelogram. And in laying out the work, when a kitchen is to be fitted up on the plan here described, it will always be best to begin by actually drawing these six squares on the floor of the kitchen. Nearly the whole of the middle square of the back row is occupied by the open chimney fire-place, and the greater part of the middle square of the front row, is left as a passage for the cook to come to the open chimney fire-place.

All the boilers, stew-pans, and sauce-pans, are fitted into circular rings of iron, which are firmly fixed to the brick work; and are suspended in their fire-places by their circular rims. Large boilers have two rings fitted to their rims.

Deep boilers economise space, and when furnished with good registers and dampers, the additional quantity of fuel they require, will be too trifling to be considered.

Common bricks were used in the construction of the fire-places, but care was taken to lay them in mortar composed of clay and brick dust, without any sand, with only a very small proportion of lime.

Dampers are essentially necessary in the chimney or canal by which the smoke is carried off. These dampers should be opened more or less, as the quantity of air is greater or less, which is admitted into the fire-place. The register and damper will also be found useful in putting out the fire when not wanted. It is of little importance whether the dampers be placed near the fire, or far from it; or what is their form; provided they be so constructed, as to diminish at pleasure, and to close entirely the canal by which the smoke makes its escape.*

* A piece of sheet-iron is the simplest damper we can use.....*Editor*.

Of the Construction of KITCHEN UTENSILS.

Iron is certainly the best and safest metal for all Kitchen Utensils. The insides should not be scoured, as they are thereby disposed to rust: but merely washed out and rinsed with warm water, and wiped with a dry dish-cloth; the surface of the metal will soon become covered with a thin crust or coating of a dark brown colour, resembling enamel; which covering, if suffered to remain, and to consolidate, will at last become so hard, as to take a very good polish, and defend the surface from farther corrosion; and consequently to prevent the food from acquiring that taste and colour, which iron is apt to impart to it.

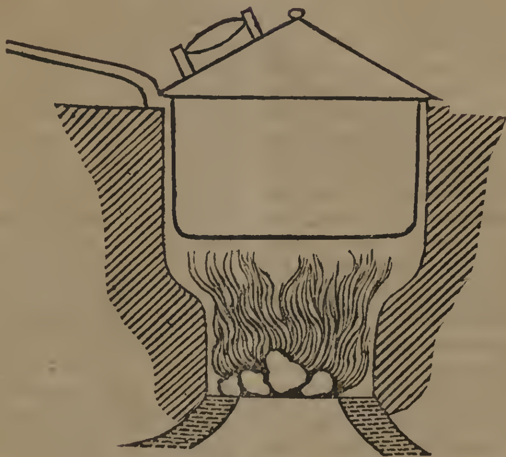
Iron utensils designed for frying, or cooking in fat, must never have hot water put in them. But when washed out, must be well wiped with a dry cloth before they are put away.

The most wholesome material for stew-pans and sauce-pans, is earthen ware, glazed with salt.... [See article POTTERY.] But the application of sudden heat and sudden cold, must be avoided, as it will crack. The globular form is the strongest, and the thinner the utensil is made, consistent with strength, the better it will be.

The handles of sauce-pans should be rivitted to their insides, and the cover so contrived, as to fit the opening of the sauce-pan, by making a notch in one side of it to receive that part of the handle which is in the way. But when new pans are to be constructed, a circular rim of iron, flat on the under side, should be provided for each sauce-pan, with a handle belonging to it, of the form here presented.

And by forming this sauce-pan to its rim, its form at its brim will be circular, within and without, kept more easily clean, and rendered more durable, by reason of there being no iron rivets to be acted upon by the copper of the pan..... The circular plate of tin, or of thin sheet copper tinned, which forms the bottom of the cover, should be of the same diameter precisely, as the outside of the brim of the sauce-pan. The bottom of the cover may either be made quite flat, concave, conical, or concave and of a spherical figure. The handle of the sauce-pan should be bended upwards, so as to be above the level of the brim of the sauce-pan; otherwise, when the utensil is in its place, there would not be room between the handle and the surface of the brick-work, for the fingers to pass in taking hold of the

handle to remove the sauce-pan. This is evident from a bare inspection of the following figure, which represents the section of a sausepan, fitted in its fire-place.



Of the management of the fire in heating an IRON OVEN.

The strong draught into a well construced fire-place, renders it necessary to keep the fire-place door constantly closed, and to leave but a small opening for the passage of the air through the ash-pit register. The fire-place should be small, and particularly the grate on which the fuel burns. For an oven or roaster of sheet-iron from eighteen to twenty inches wide, and from 24 to thirty inches long, and from twelve to fifteen inches high, the fire-place should never be more than six inches wide, six inches deep, and about nine, or at most ten inches long : the grate should be placed twelve inches below the oven, and this fire-place should seldom be half filled with coals. If the oven, or roaster (which see) be set in a manner that the flame or smoke from the fire spread round it on every side, there will be no want of heat for any of the common purposes of cookery, and its intensity may always be regulated by means of the damper in the chimney, and the register in the ash-pit door.

It is of great importance to cause the smoke that heats the oven, to descend at least as low as the level of the bottom of the oven, after it has passed round and over it, before it is permitted to rise up freely and escape by the chimney into the atmosphere. The oven will thus retain its heat for a great length of time. More effectually to prevent the fire from operating

with too much violence, upon any one part of the bottom of the oven, the brick-work may be sloped outwards and upwards on every side from the top of the burning fuel, to the extreme parts of the sides and ends of the bottom of the oven, that the whole of the bottom may be exposed to the direct rays from the fire. In some cases the flame passes up both sides, and then descends by the end to the level of its bottom, or rather below it; and passes off backward and forwards in horizontal canals by the sides of the oven, before permitted to go off into the chimney. Either of these methods will answer, provided the smoke be made to descend, after it has left the top of the oven, as above and provided the smoke canal be furnished with a damper.

In setting an oven, provision should be made, by leaving holes, to be stopped up with stoppers, for cleaning out all the canals in which the smoke circulates; these canals must never be less than two inches wide; and where they are not more than four or five inches deep, they should be from three to four inches wide, otherwise they will be very often choaked up with soot.

Holes closed with stoppers, must also be left in the brick-work, for cleaning the flues.

The fire-place for an oven of the smallest size should be nearly as capacious as one which is destined for heating a much larger oven; and I have found by repeated experiments, that a nest of four small ovens, set together, and heated by the same fire, will require but very little more fuel to heat them than would be necessary to heat one of them, were it set alone.

A cottage oven eleven inches wide, ten inches high, and sixteen inches long, will require a fire-place five inches wide, five inches high, and seven inches long: and for four of these ovens, set together in a nest, the fire-place need not be more than six inches wide, six inches high and eight inches long.

I have in my house two iron ovens, each eighteen inches wide, fourteen inches high, and twenty-four inches long, set one over the other, and heated by the same fire; and their fire-place is only six inches wide, six inches high, and nine inches long.

Having been thus particular in detailing the important principles respecting the economy of fire; and the arrangement of the kitchen apparatus of Count Rumford; the reader must be referred to the articles Oven and Roaster for additional information upon this interesting subject.]

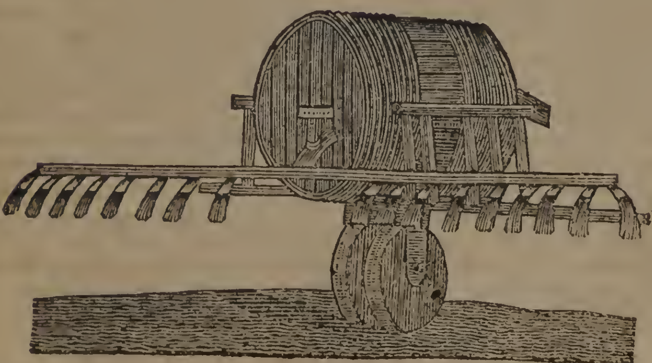
KITCHEN-GARDEN, a piece of ground laid out for the cultivation of fruit, herbs, pulse, and other culinary vegetables.

A kitchen-garden ought to be situated on one side of the house, adjoining to the stable, whence the dung may be easily conveyed into the inclosure. As soon as the wall is built, Miller directs a border to be formed beneath it, from 8 to 10 feet in breadth, on which, if in a southern aspect, the earlier plants may be raised. On those borders which are exposed to the north, some late crops may be obtained; but no pease, beans, or other deep-rooted plants, should be set too near the fruit trees.

The ground is next to be divided into quarters, the size of which ought to be proportioned to the ex-

tent of the garden: because if these divisions be two small, the soil will be wasted in walks; and as the quarters are generally inclosed by espaliers of fruit-trees, the vegetables which may be planted there, will not thrive for want of sufficient exposure. The walks should, therefore, be proportioned to the size of the ground: and in a small garden, they ought not to exceed 8 feet; or, if it be a large one, from 12 to 14 feet in breadth. It will also be advisable to place a border, 3 or 4 feet wide, between such walk and the espalier, in which may be sown small salads, or any similar vegetables, that do not take deep root, or continue long in the ground. These quarters, however, ought not to be planted, or sown, for raising the same crops two successive years; and the warmest soil, or that which is next to the stable, where it is best sheltered from the cold winds, will be the most proper for hot-beds, to promote the growth of early cucumbers, melons, &c. The most important point in this, as well as every other branch of horticulture, consists in digging and manuring the land *well*; in allowing a proper distance to each plant, according to its different growth; and, particularly, in eradicating all weeds; an object that will be considerably facilitated by continually extirpating them from the dunghill; as, otherwise, their seeds or roots will be constantly introduced into the garden, and propagated with the manure.

Another circumstance of equal importance, is the *watering of gardens*, for which the implements commonly employed appear to be very inadequate. The filling, and carrying, of these vessels to the spot where they are to be used, are attended with great labour and loss of time. To remedy these inconveniencies, different machines have been invented: one of the most ingenious and useful, is that contrived by M. Sylvestre, and of which the following is an accurate representation:



It consists simply of a cask, capable of holding a sufficient quantity of water, for the purpose of irrigating the garden. The hinder part of this vessel is furnished with a cock that communicates with the watering pipes, and the cask is supported on a strong frame, with one or two wheels, calculated for walks about 18 inches wide. The carriage may be drawn by a mule or an ass, and requires a person to guide the animal; to support the vessel when it is liable to be overturned ; and to open and shut the cock as often as is necessary. Thus, one man will be able to water a considerabe space of ground in a short time, and to sprinkle that fertilizing fluid in an equal and regular manner.

KNAWELL, or *Scleranthus*, L. a genus of plants comprising three species, one of which is a native of Britain ; viz. the *annuus*, Annual Knawell, or German Knot-grass, which grows in sandy soils and corn-fields ; flowers in the months of July and August.

The Swedes and Germans introduce occasionally the steam arising from a decoction of the knawell into their mouths, with a view to cure the tooth-ach. Its sweetish leaves are astringent. Goats and sheep eat this plant, but cows totally refuse it.

KNEE-GRASS. See Rough PANICK-GRASS.

KNEE-HOLLY, or *Ruscus*, L. a genus of plants, consisting of several species, one of which is indigenous, namely, the *aculeatus*, Common Knee-holly, Butchers'-Broom, or Prickly Pettigree. It grows in woods, thickets, and hedges ; flowers in the months of May and June.

This plant is much used by butchers, for brooms to sweep their blocks. Branches of it are likewise employed by hucksters, to defend their bacon and cheese from *mice;* because these vermin cannot penetrate through the prickly leaves.... The root of the knee-holly is reputed to be aperient, and is chiefly used in diet-drinks, for removing slight obstructions of the viscera, and promoting the fluid secretions.

[KNIFE-BOARD. A common knife-board covered with thick buff-leather,on which are put,emery one part, *Crocus Martis* three parts in very fine powder,mixed into a thick paste with a little lard or sweet-oil, and spread on the leather the thickness of a quarter-dollar, gives a far superior polish and edge to knives, and it does not wear the knife near so much as the common method of using brick-dust on board. These buff-leather boards are sold in London ready made.]

KNOT-BERRIES. See CLOUDBERRY.

L.

LABDANUM, or LADANUM, a resinous juice exuding from the *Cistus creticus*, L. a native of the Levant, whence it is imported.... The best sort, (which is extremely rare even in Turkey), consists of very dark-coloured, soft masses, and almost liquefies, when held in the hand: it emits an agreeable odour, especially while burning, and has a slightly pungent, bitterish tase. This medicinal drug is chiefly used externally, for attenuating and discussing tumors.

[LABORATORY, is an essential part of the farm establishment. In this house, all the operations, which are too commonly performed in the kitchen, to the great danger of those present, may be safely attended to. An important use to which this house may be applied, is, that of smoking the meat hanging on cross-beams above, with the smoke from the fire below: For this purpose, there should be dampers of sheet-iron through the flue of the chimney, and holes of the size of a brick edgewise left for the smoke to issue. When the smoke is not wanted, these may be easily stopped.]

LABOUR, in a general sense, implies the exertion of human strength in the performance of any kind of work.

The *price* of labour has, at all times, varied; and, as the poorer classes feel, with additional rigour, every evil arising from the pressure of the times, different expedients have been devised, with a view to alleviate their burthens, supply their wants, and render them more comfortable.

From these investigations, it appears that, in the middle of the fourteenth century, [in England,] the usual price of labour was 2*d*. per day; and wheat was sold at from 3*s*. 4*d*. to 4*s*. per quarter, of eight bushels.

In the middle of the fifteenth century, the pay of a labourer per day, was 3*d*.; and wheat cost from 5*s*. to 5s. 6*d*. per quarter.

In the earlier part of the sixteenth century, the price of labour rose to $3\frac{1}{2}d$, and that of a quarter of wheat to 7*s*. 6*d*. About the

middle of the seventeenth century, the pay of a labourer, upon an average, was in Essex 13d.; and corn had risen to 40*s*. per quarter.

Toward the latter end of the eighteenth century, the daily pay of a labourer was from 14*d*. to 18*d*. in the country, and from 2*s*. to 2*s*. 6*d*. in the metropolis; while the price of wheat was 48*s*. per quarter....We forbear to state the average pay of labour during the late exorbitant prices of grain, and every other article of food; when all proportion between *merit* and *reward* appeared to have been suspended.

The payment of *daily* wages, however, serves but imperfectly to ascertain the *real* price of labour; as a considerable portion of work is performed by the piece; so that a labourer in general earns from 3*d*. to 6*d*. per day more than by the common pay. For, without this, or some similar method, the reward of labour would be inadequate to the maintenance of those numerous persons, who possess no other means of providing for their infirm wives, or hapless children. And we conceive, that if their wages could be so regulated as to rise and fall with the price of wheat, considerable benefit would thus result to society.

The curious and philanthropic reader, who feels an interest in this popular inquiry, will be fully gratified by a perusal of Mr. Davies' *Case of Labourers in Husbandry stated and considered*, &c. (4to. pp. 200, 10*s*. 6*d*. Robinsons, 1795,) and Sir F. M. Eden's *State of the Poor*, &c. (3 vol. 4to. 3*l*. 3*s*. White, 1797,) in which the situation of the labouring classes is clearly developed.

LABURNUM, the Broad-leaved, *Cytisus laburnum*, L. a valuable exotic tree, introduced from the Alps, into the Highlands of Scotland.

This plant is very hardy, and will thrive on poor shallow lands, and in exposed situations: it is propagated by seeds, which should be deposited in March, in a light and rather moist soil, where the tree is intended to remain; and, in the succeeding month, young shoots will appear. But, if sown in autumn,the seeds do not germinate till the following spring.

The broad-leaved laburnum forms an agreeable ornament for parks and gardens; as it grows rapidly, with a straight stem, and, in the course of four years, is generally twelve feet high. Its wood is frequently employed on the Continent, and in the Highlands, for making chairs, tables, and other articles of househould furniture, which are said to resemble the finest mahogany. Suckow remarks, that a decoction of the fresh branches and leaves of this tree, imparted an excellent dark-brown colour to cloth prepared in a solution of green vitriol.

Labyrinth. See Maze.

LAC, or Gum-lac, a species of wax, with which the Lac-insect, or *Coccus Lacca*, L. that frequents several species of the fig-tree, forms cells resembling the honey-combs of bees.

Gum-lac has received various names, according to the different states in which it is obtained. The *stick-lack* is the wax adhering to the smaller branches of the tree, and which is unprepared. This is first separated from the twigs to which it is attached; and after being grossly powdered, and divested of its colour, by digesting it in certain

liquors, is called *seed-lac*. When the stick-lack is melted over a moderate fire, then freed from its impurities, and formed into cakes, it is denominated *lump-lac*. The last species is termed *shell-lac*, and is prepared by liquefying, straining, and reducing the cells into thin transparent plates, in a manner peculiar to the natives of India.

Lac is applied to various purposes of ornament and utility..... Considerable quantities are used in the making of sealing-wax; in japanning; for varnish; and in painting. It also imparts a fine red colour to silk and cotton, when these have previously been immersed in a weak decoction of the bark, known among dyers by the name of *load*.

Lac is likewise of service as a medicine: for which purpose the *stick-lac* is in great esteem on the Continent, especially for relaxed and spungy gums arising from cold, or from a scorbutic habit. With this intention, it is either boiled in water, with the addition of a little alum for promoting its solution, or it is used in the form of a tincture, prepared with rectified spirit: the latter has a grateful odour, and a bitterish, astringent, though not unpleasant taste, and is chiefly recommended in scorbutic and rheumatic disorders.

LACE, in commerce, a texture composed of several threads of gold, silver, silk, or thread, which are interwoven and worked on a cushion with spindles, according to the pattern designed.

There are various kinds of lace, denominated either from the place where they are manufactured, or from the particular method of working. Such are Point, Brussels, or Flanders lace, made in the Netherlands; and blond or bone-lace, which is produced in England, chiefly in the county of Buckingham.

When gold or silver lace happens to be tarnished, the best liquid that can be used for restoring its lustre, is spirit of wine, which should be warmed, before it is applied to the tarnished spot. This, in Dr. LEWIS's opinion, is far preferable to soap, or the alkaline liquors usually employed; as the former does not remove the colour of the silk or other embroidery, with which the lace may be connected.

Method of separating gold or silver from lace, without burning it..... Let the lace be first cut to pieces, tied up in a linen cloth, and boiled in soap-ley, till its size be considerably diminished: the cloth is now to be taken out of the liquid; rinsed repeatedly in cold water; and beaten with a mallet, in order to extract the alkaline particles. On opening the linen, the metallic part of the lace will be found pure, and undiminished, while it retains its natural brightness.

LACKER, or LACQUER, is a kind of varnish, applied to brass, tin, and other metals, in order to improve their colour, and to prevent them from tarnishing.

The best laquer is prepared from rectified spirit of wine, and *seed-lac*, in the proportion of three ounces of the latter to one pint of the former. The mixture is digested for some hours in a moderate heat; when the liquor is strained, aud left to subside. In this state, it is ready to receive the shade required, by adding gamboge, annotto, or other tinging drugs.

With a view to impart a golden

colour to metals, two parts of gamboge are usually added to one of annotto; but, a better method is, to dissolve those substances separately, and to ascertain the particular shade, by mixing different proportions of the two solutions. If silver or tin are to be lacquered, it will be necessary to employ a larger quantity of the colouring matters than is required, when this kind of varnish is to be applied to brass.

LACKEY-MOTH, or *Phalæna Bombyx Neustria*, is a species of moth that commits great depredations on fruit-trees; around the branches of which it deposits numerous eggs, that exhibit the appearance of a necklace. These are very hard, and adhere closely to the bark; so that it becomes necessary to remove them by a knife; care being taken to spare the bark as much as possible. Next, the composition and powder mentioned in the article TREE, must be applied to every part which may have been wounded by the instrument.

LACTEALS, in physiology, are the absorbing vessels of the mesentry, and consist of certain small tubes, situated in the intestines; whence they convey the *chyle*, or that milky fluid which is generated from the food in the first passages, into the common reservatory, or the mass of the blood. They are furnished with an incalculable number of valves, which prevent the return of the chyle into the stomach: in their passage through a number of glands, the nature of the last mentioned fluid is considerably altered, and prepared for its assimilation with the blood.

LADIES'-MANTLE, or *Alchemilla*, L. a genus of plants comprising four species, three of which are indigenous, and of these, the principal is the *vulgaris*, or Common Ladies'-mantle, growing frequently in meadows and pastures: it flowers from June to September.

This plant might be easily cultivated, either by dividing the roots, or scattering the seed in autumn. It requires a moist soil, a shady situation, and to be kept clean from weeds.

The leaves of the Ladies'-mantle are mildly astringent; though at present seldom used in medicine. .....According to GLEDISCH and BAUTSCH, the whole plant may be advantageously employed in tanning.....Horses, sheep, and goats, eat this vegetable, but it is not relished by cows; and hogs totally refuse it.

LADIES'-SMOCK, or *Cardamine*, L. a genus of plants consisting of sixteen species, seven of which are indigenous: the principal of which is the *pratensis*, or Common Ladies'-smock, growing in meadows and moist pastures; it flowers in the month of May.

According to Dr. (now Sir GEORGE) BAKER, the flowers of this plant may be used with great advantage in hysteric and epileptic cases, if taken twice a day, in doses of from twenty to ninety grains each. In Cornwall, the flowering tops have successfully been employed for the cure of epilepsy, for several generations. Goats and sheep devour this herb, but cows dislike it, and neither horses nor swine will touch it.

LAKE, in geography, a collection of waters of a considerable extent, and having no immediate communication with the ocean.

Lakes are divided into two classes: 1. Those, which contain fresh water; and, 2. Such as are

saline. The chief lakes in England are those of Keswick and Winander-mere, in the northern counties: there are likewise several in Scotland, which are distinguished by the name of *Lochs*.

In cold climates, lakes are of considerable utility; for the warm vapours exhaling from them, mitigate the intense frost that prevails during the winter season. They are of still greater advantage in the southern regions, when situated at a distance from the sea; because the evaporation caused by the heat of the sun, refreshes the adjacent country with frequent showers, and thus renders it a beautiful garden. Beside the genial temperature to which the British lakes greatly contribute, they contain abundance of fish, and might be rendered still more profitable by conveying to them the spawn of fish from rivers, by means of jars. This method has been long practised in China, and, we conceive, might be productive of great advantages, if it could be adopted in this country.[See Fish.]

LAKE, in the imitative arts, signifies a red colour employed by painters, which was originally formed of *gum-lac*. It is at present prepared chiefly from scarlet rags, cochineal, or Brazil-wood. The best, however, is obtained from the first of these articles, in the following manner:

First, let a pound of pearl-ash be dissolved in two quarts of water, and the solution be filtered through paper. A pound of clean scarlet shreds, and two quarts of water, are next to be added to the liquor, and the whole boiled till the rags are perfectly divested of their tinge; when they are to be taken out and pressed. Three additional pounds of shreds are now to be boiled in the same solution; and, during this process a pound and a half of the bone of cuttle-fish are to be dissolved in one pound of aqua-fortis. This liquid is next to be combined with the former solution; and the whole, on being suffered to subside, will deposit a sediment, which forms what is called *lake*. The liquor is then to be strained, and the sediment mixed four or five times, successively, in two gallons of spring water, till all saline particles are extracted; lastly, it is to be drained, and dropped through a funnel on clean boards, when the lake will assume the form of cones or pyramids, in which it must be suffered to dry, and the preparation will be fit for use.

For a more simple method of preparing different lakes, or pigments the reader will consult the article Colour.

LAMB, the young of a sheep; which, if a male, is during the first year, called a *wedder*, or *wether-hog*; and if a female a *sheave*.

The most proper time for ewes to *lamb*, is from the latter end of April to the beginning of June; and, in the course of sixteen or eighteen weeks, the young animals may be taken from their dams: they are, however, very tender, and require the greatest attention, especially during snowy weather, when they not unfrequently perish from want of fresh grass, and their aversion to eat hay. In order to remedy this inconvenience, it has been recommended to turn a few old sheep that are generally fond of hay, among the lambs, which will thus be speedily induced to follow their example.

Lambs are subject to few disorders:....when they are sick, the drinking of mare's or goat's milk,

diluted with warm water, will greatly tend to preserve them from taking cold; and as many, when yeaned, are apparently dead, it is advisable to blow into the mouth and nostrils; by which simple method numbers have been immediately restored.

The most fatal distemper, however, with which lambs are affected, is the *blood* or *red-water*. The disordered animals are, in general, seized with lameness, and a slight swelling of the joints, but which is attended with a violent inflammation, that spreads over the whole body, and, if neglected, proves fatal in the course of twenty-four hours.

The red-water is occasioned by too great a quantity of undigested food remaining on the stomach. As soon, therefore, as the lambs are attacked, the best method hitherto known is, to take them from grass, bleed them, and administer an emollient clyster, which is to be repeated, in case no evacuation take place in a short time. Two or three grains of tartar emetic, or as many ounces of sweet-oil, are now to be given and the bleeding repeated, if the animals do not appear to recover. This treatment is to be continued for the space of four or five days, during which the diseased creatures should be fed with milk.

Lamb forms a considerable article of food: being light and wholesome, it is well calculated for weak and delicate stomachs. though less nourishing than mutton. *House lamb*, which is thus denominated from the animals being fed and fattened within doors, is neither so wholesome nor so nutritive as the natural meat. Its flesh is devoid of taste, and eaten only by epicures; who, regardless of the dictates of reason, and the rules of temperance, attend only to the gratification of their sensual appetites....[See SHEEP.]

LAMB'S-LETTUCE. See CORN SALAD.

LAMB'S-QUARTERS. See WILD ORACHE.

LAMENESS, a weakness that may arise from various causes, in any part of the body.

Where this defect originates from natural deformity, it is generally incurable; few instances, however, occur in which lameness is hereditary; though it may also be induced by causes that are difficult to be discovered. If it be occasioned by external accidents, such as luxation of the thigh at the birth, fractures, &c. it can be cured only by a skilful reduction of the dislocated limbs, though it will always be attended with *halting*.

Frequently, however, the leg, in consequence of the rigidity of the muscles destined to put it in motion, contracts to such a degree that it cannot be moved without limping. In this case, it will be advisable to apply emollient fomentations; to immerse the part affected in mollifying baths; or, for very robust individuals, to expose it frequently to the action of a pump from mineral springs, and to wear a shoe furnished with a leaden sole, the weight of which should be proportioned to the contraction of the limb.

Much lameness, as well as deformity, might certainly be prevented, if a stricter attention were paid to the early treatment of children. These are often afflicted with a weakness of the hips, accompanied with a lameness of both sides of the body; which is wholly occasioned by inducing them to

walk without any assistance, before they have attained sufficient strength to support themselves. Such debility may, in some measure, be counteracted by tying a girdle round the waist, that should extend to the whole circumference of the belly; and which, if well braced at the hips, will invigorate the loins, while it gradually enables children to walk. It will also be advisable to bathe such weak limbs in astringent decoctions, frequently in the course of the day, for several months.......See RICKETS.

Beside these common causes of lameness, there are various other circumstances which our limits will not permit us to discuss, as they relate peculiarly to surgery. A practical work on this subject is much wanted; and we conceive it would be of essential service to society, if a popular treatise were properly executed, in which the manifold causes of lameness might be discriminated, and the most appropriate remedies judiciously stated, according to the different stages of the affection.

LAMENESS, *in Horses*........See HALTING.

LAMP, a vessel containing oil, or other inflammable matter, for the purpose of affording light.

The utility of lamps in domestic life, is universally acknowledged; we shall, therefore, proceed to state such patents as have been granted for the inventions or improvements relative to this branch of manufacture, without discussing those theories in which ingenious men have occasionally indulged.

The first we shall notice is that of M. ARGAND, who obtained a patent in 1784: his privilege being now expired, and his invention generally adopted, we shall briefly observe, that the superiority of his lamp depends on the admission of a larger volume of air to the flame, than is practicable on the common plan. This object is effected by employing a circular wick, so that a strong current of air rushes into the cylinder round which the wick is placed, and thus, together with the atmosphere, excites the flame to such a degree, that the smoke is entirely consumed. The light and heat are by this method remarkably increased, while the expense of the oil is considerably reduced; because those particles, which, in the usual lamps, are dissipated in smoke, will, by M. ARGAND's invention, be converted into a brilliant flame.

A patent was granted in 1787 to Mr. MILES, for his new method of making lamps of different forms, so as to emit an undiminished light, however it may be agitated; and which may also be fixed in halls, shops, &c. As its specification is too complex to be understood by those who are unacquainted with the manufacture, inquisitive readers will consult the 3d vol. of the *Repertory of Arts and Manufactures.*

Another patent was obtained in the same year, by Mr. PETER KEIR, for a contrivance of raising the supply of oil in lamps. The whole effect is produced by the application of another fluid, the specific gravity of which is greater than that of oil; and which communicates with the latter, by means of certain receivers, tubes, or conductors. These are so arranged, that the heavier liquid may press a column of oil upwards to any requisite height, for the purpose of supplying the lamp.

Farther, by prolonging the conductor of the heavier fluid beneath the lower surface of the column of oil, the weight of the former will hydrostatically act upon such surface, and raise the column. Thus, the lamp will not only be furnished with the purest particles of oil from the upper part, but the flame will also be considerably elevated above the body of the vessel; and, being supplied from a contracted surface of oil, it will consequently afford a more diffused light, with a considerable diminution of shade. For a more minute account of this ingenious contrivance, we refer the inquisite reader to the 8th vol. of the work before quoted.

The last patent we shall notice, was granted in 1800 to Messrs. WHITE and SMETHURST, for their *Improved Lamp-burner*. The whole is modestly called an improvement on the burner of the common Argand lamp; and the object of which is, to afford a more free and plentiful supply of oil to the ignited part of the wick; so that it will burn better, require less frequent snuffing, and answer well, even with oil of an inferior quality. These advantages are obtained simply, by leaving a larger than the usual space between the two tubes, within which the wick is placed. Yet it is necessary to contract such space towards the top, in order that the burnt crust or cinder may be more conveniently removed; an object which may be effected by applying a ring or piece of metal, conically or otherwise formed, so as to reduce the space in the upper part of the lamp to the usual dimensions.

The advantages of Messrs. WHITE and SMETHURST's improvement, are: 1. That the inconvenience hitherto complained of, respecting the mode of cleaning and dressing the lamps, is thus removed; as, upon their plan, the capillary tubes of the cotton wick are prevented from being at any time obstructed by the viscid nature of the oil, while its ascent is promoted by such capillary attraction. 2. The quantity of oil consumed by these improved lamps is, by the patentees, stated to be less in the proportion of at least four to five. 3. One of the most important advantages thence derived, is, that of the wick being rendered fit to burn common whale, or seal-oils, which are sold at about half the price of the best spermaceti oil, the only inflammable fluid hitherto used in ARGAND's lamps; while the former produce an equal degree of light.

We have already pointed out,(in article CANDLE) the superior utility of lamps, especially for sedentary or studious persons; but as the light emitted by them is frequently too vivid for weak, or irritable eyes, we would recommend the use of a small screen, which should be proportionate to the disk of the flame, and be placed at one side of the light, in order to shade it from the reader's eye, without excluding its effect from others, or darkening the room. Such a contrivance is equally simple and useful: it may consist of either paper, or taffety, slightly gummed; and, being easily folded snd carried in the pocket, is far superior to the common screens.

We cannot conclude this article, without pointing out another circumstance in which lamps are superior to candles, namely, their *cheapness*. From experiments made some years since, with the express view of ascertaining the expense of

burning chamber-oil, it appears that a common taper-lamp, with eight cotton threads in the wick, consumed in one hour $\frac{325}{1000}$ parts, or about one-third of an ounce of spermaceti oil. which at that time cost 2*s*. 6*d*. per gallon; so that the expense of burning for 12 hours, amounted to 4-57 farthings, or about $1\frac{1}{8}$ of a penny. The light emitted by such lamp was as clear and bright as that yielded by candles, which run from eight to ten in the pound. Subsequent trials were made with M. ARGAND's lamp; the result of which was, that the latter will continue to burn *three* hours for the value of *one* penny. And though a candle, when newly snuffed, may appear to be preferable, yet the lamp is ultimately superior, both for steadiness and durability of light. Nay, one good lamp proved equal in its effect to half a dozen tallow candles, consisting of six in the pound, the expense of which was *eight pence*, while that of the lamp amounted to only *two pence halfpenny*, in the space of *seven* hours.

LAMP-BLACK, is one of the black colouring matters, the preparation of which has already been stated, vol. ii. p. 179.

We again introduce this substance, as it possesses several remarkable properties: thus, lamp-black is liable to undergo spontaneous inflammation, if it be kept for some time closely confined, and be afterwards suddenly exposed to the air: there have been instances of its taking fire in shops, and occasioning the most distressing scenes of conflagration. But, when lamp-black is combined with oil, so as to form a black varnish, it appears from various experiments, that bodies painted with this compound resist the effects of electricity in a most surprizing degree; and that they have, in a variety of cases, even repelled lightning.

In 1798, a patent was granted to Mr. WILLIAM ROW, for a new invented mineral lamp-black. This is obtained from pit coal, or any other kind of fossil coal; the blackest particles arising from the smoke of which, are deposited in certain tubes, or receptacles. whence they are removed in the course of six or eight days, and packed up for sale. For the particulars of this unexpired patent, the inquisitive reader will consult the 10th vol. of the *Repertory of Arts*, &c. where the process is duly specified.

LAMPAS, in FARRIERY, denotes an excrescence in the roof of a horse's mouth, which is sometimes so luxuriant that it grows above the teeth, and thus prevents his feeding.

This malady may be cured by cauterizing the flesh with a hot iron; an operation which should be carefully performed by a skilful Veterinary Surgeon, lest the swelled part be penetrated so deep, as to scale off the thin bone, that lies under the upper bars: after having thus extirpated the tumor, it will be necessary to anoint the sore parts with burnt alum and honey, which form a very proper application to an ulcerated mouth in general.

LAMPREY, or *Petromyzon*. L. a genus of fish comprising three species, which are chiefly distinguished by their peculiar back fins.

1. The *marinus*, or SEA LAMPREY, which, in shape, resembles an eel. has small eyes, covered with a light blue membrane, and the pupil is encompassed with a gold-coloured ring. During cold wea-

ther, this fish conceals itself in the crevices of rocks; on the pebbly edges of which it is an usual expedient among anglers, to form pits extending to the water-side: into these a little blood is thrown, to induce the lamprey to put forth its head between two rocks. As soon as the hook, which is to be baited with crab, or some other fish, is presented, it is greedily swallowed, and thus the prey is easily taken.

2. The *fluviatilis*, or Lesser Lamprey; the mouth of which is like that of the preceding, but the colour of its back is either brown or dusky, sometimes mixed with blue, the whole underside being silvery.

These fish sometimes grow to the length of ten inches, are found in the rivers Thames, Severn, and Dee; are potted with the larger kind, and occasionally preferred, on account of their milder flavour..... Vast quantities are taken about Mortlake, and sold to the Dutch, who employ them as bait for their cod fishery. It is computed that above 430,000 have in one season been vended to them at 40*s.* per thousand; as they possess the secret of preserving the lamprey till the turbit fishery commences.

3. The *bronchialis*, on Lampern, which is found in the Isis, near Oxford, and other British rivers; it is about eight inches long, and the body does not exceed the thickness of a swan's bill. Unlike the other species, lamperns conceal themselves in the mud, and never adhere to stones, or other matters.

The flesh of these fish, in general, is white, fat, soft, and easy of digestion: it has an agreeable taste, and is not less nutritive, though more wholesome, than that of the eel: those of a larger size, however, possess a superior flavour.

LAND, in general, signifies any kind of ground, but is particularly applied to such as is ploughed, or tilled for agricultural purposes.

As we treat, in alphabetical order, of the different methods of cultivating the earth, we shall at present confine our attention to the proper modes in which waste, or other soils, may be most advantageously converted from a natural and unproductive, into an artificial state.

The best method of meliorating *swampy ground*, after it has been properly drained, is to pare and burn it. Where the earth, however, is dry, and the soil or mould so thin that it will not admit of paring the surface, the most effectual mode of bringing it into tilth, will be to plough it well, and turn the grass-sods inward. As soon as the new surface is mellowed with frost, the field should be harrowed, in order to fill up all the seams: thus, the air will be excluded, and the sod become perfectly rotten. In this state, it ought to lie during summer, and the succeeding winter; but early in the following May, it will be requisite to *cross-plough* the whole, after which the earth must be well pulverized with a brake-harrow, and thus prepared for a future crop.

[Swampy land is recovered sooner by sowing Herd-grass than by any other mode. See that article.]

Old heath-lands may be advantageously reclaimed from their barren condition, by first passing a drill roller over them; after which they should be sown with oats and grass-seeds, at the same time. When the harvest is finished, the soil is directed to be *fed hard* with sheep,

for two years; then repeatedly ploughed and harrowed, so as to render it fit for the reception of cole-seed: this vegetable is likewise to be *fed off* with sheep, and the soil worked in a similar manner for rye, together with which grass seeds are again to be sown. Such crop should now be suffered to remain as a layer, till it can be well manured with marl, in the proportion of about sixty loads per acre; after which it may be brought into a regular course of tillage. By this method, the whole *flag* will have sufficient time to putrefy, and the soil will not be easily exhausted, as is frequently practised with *new* lands.

Ground thus managed, has been found to be well calculated for *buck-wheat*.

In the 13th vol. of the *Transaction of the Society for the Encouragement of Arts*, &c. Mr. RICH. RAMSDEN BRAMLEY communicates the most beneficial method of cultivating meadows or pasture land that is over-run with coarse grasses, or which is either naturally, or has from neglect become rough and uneven. The first process he states to be paring, after which a small trench should be dug, in which a row of potatoe-sets may be planted, and slightly covered with the sods, serving as a nourishment to the rising crop, while they greatly contribute to form a light soil.

The ground is next to be completely cleaned by ploughing, harrowing, &c.; then sown either with oats or barley in the ensuing spring; after which sixteen bushels of hay, and ten pounds of clover-seeds per acre, should be uniformly scattered, and harrowed in. Thus, the soil will be rendered very fertile for the culture of corn, or other grain; and Mr. BRAMLEY adds, that the paring and digging affords so decided an advantage to the crop as amply to compensate for the additional expense: besides, the land will afterwards be ready for cabbages, carrots, or onions, in case such crops should be wanted; and, if there be any inequalities in the ground, they will, by this management, be speedily remedied.

For the most effectual method of breaking up and meliorating marshy, or moorish soils, the reader will consult the articles MARSH and MOOR.

In the year 1799, a patent was granted to Mr. HAYES, for his invention of various machines or implements for agricultural purposes, upon a new construction.... These are applicable to the tillage and culture of *every kind of soil;* but as they are too numerous to be detailed here, and as the manufacture of them is confined to the patentee, we purposely omit their specification, and refer the inquisitive reader to the 12th vol. of the *Repertory of Arts, &c.* where the various articles are minutely described, and illustrated by an engraving.

[The following excellent practical directions, for bringing waste lands into cultivation are taken from Dr. JAMES ANDERSON's Rural Essays, vol. iii.; a work which cannot be too warmly recommended to all those who wish to derive the greatest profit from their farms.

The object that an improver of waste land ought to have chiefly in view, should be to have it laid down into profitable grass land, so soon as that can be *properly* accomplished; and the undertaker should be cautious not to push forward with his improvements faster than the

circumstances he is in will permit; and, in particular, never to go beyound the bounds that the manures he can command are sufficient to accomplish *completely*.

Lime is more valuable than any other manure, and the first questions ought to be, in an undertaking of this sort, *where can lime be obtained*, at *what price*, and in *what quantities?* But lime on poor soils is an inefficacious manure, unless where it is applied in very considerable quantities at once. Less than 300 bushels he accounts too little, in almost any case: and dung ought to be used the same season, as they will produce more powerful and aggregate efforts, than if either had been separately applied; the lime enabling dung to operate upon the soil in a manner it never otherwise would have done; but care must be taken not to exhaust the soil after it has been thus enriched, before it be laid down to grass.

In every case, he adds, the sooner the lime is laid upon the soil, after the trenching process has been completed, and the surface smoothed, and the more quickly and intimately it can be blended with the mould, the better it will be on every account. Hence lime should always be spread while it is yet in its dry and powdery state; and ploughed and harrowed in, as soon as possible after it is spread, to prevent its running into clots by moisture.

Dr. A. further observes that it is most advisable to spread the lime when in its dry, powdery state, immediately after slaking, and to plough for the first time after, with a more shallow furrow than usual, because at that time, a larger proportion of it is turned into the bottom of the last made furrow than at any succeeding ploughing and therefore more of it will be buried beneath the staple, than at any other time, if the furrow shall have been deep.

If manure be not at hand, it is necessary to bring crude soils into a proper tilth for grass, by *summer fallowing*. In general, one year of fallow will be required at first, a crop of turnips may be had the second season, by which time the field will be reduced to that husband-like state, which a good farmer ought ever to aim at.

The *second ploughing* ought to be as deep as the nature of the soil will admit. If the subsoil be retentive and the stratum below of a good quality, or better than that on the surface, (which is common where heath abounds) it ought to be opened to the depth of *twelve inches*, and if it be to fourteen or sixteen inches, the soil being still good, so much the better. No plough in stiff soils, will go to such a depth at once; where, therefore, stones are absent, it may be done by means of two strong ploughs, the one following the other in the same furrow. In this case the first plough must have it's mould-board set so as to make a very wide furrow, and the plough that follows, ought to have a narrower mould-board, so as to lift up the earth loosened by it's share, to the top of the other furrow.*

* Richard Peters, Esq. of Philadelphia, has the mortice in the plough beam long, for trench ploughing, so as to admit of altering the inclination of the coulter, as he wishes to go deep or shallow. He first runs as deep a furrow as possible, and then pares off the sod two inches deep with a light plough, and broad furrow, turning this sod into the trench, with al-

Turnips are proper for unmellowed soils. The Swedish turnip, *Rutc baga*, is particularly proper. ....It thrives exceedingly on stiff ground: but the turnips ought to be drilled, and thoroughly horse-hoed. The dung should be applied in drills before sowing. Two crops of turnips may be taken in succession, and they will reduce it to a fine tilth, and render it in excellent condition to be laid down with grass-seeds along with the first corn (grain) crop.

Peas, or vetches, may be sown on stiff soils, where turnips cannot be ventured: and those that run much to haulm, should be preferred*. Potatoes may also be raised as a first crop, to advantage. Rye and oats likewise succeed well on unmellowed ground.

Grass-seeds should be sown with the first corn (grain) crop, with an intention to allow the field to remain in grass, till the whole portion of waste has been brought under culture.

Burn breaking....where the surface of waste grounds is covered with a thick coat of *dry benty grass*, it will often prove beneficial to pare and burn the surface. This operation does not consume the mould, nor change the soil of waste ground for the worse. All that the fire does is to consume the dried vegetable fibres intermixed with the soil, during which process a small proportion of alkaline salt is generated, which is known to act as a powerful manure. See also PARING.

Experience confirms the propriety of giving only a very slight ploughing after the burning, before the seeds are sown. If the sward be properly burned and spread in due time, and if lime be mixed with it, and slightly ploughed in for turnips, an abundant crop will be obtained without dung. This crop will afford a great quantity of dung while the soil will be more mellowed than if it had been left under a bare summer fallow. If the same field be next year dunged, and sown with turnips, it will afford a still more abundant crop, and the soil will by this time be reduced into the most excellent tilth for being laid into grass.

Sheep are the stock best fitted for the most barren soils.

The propriety of TRENCHING, above recommended by Dr. ANDERSON, cannot be too warmly urged to farmers who wish either to renew their worn out soil, or to cultivate unimproved land. R. PETERS, Esq. in his address to the *Blockley and Merion Agricultural Society*, in the county of Philad.* has borne a decided testimony in favour of it; but properly observes that the depth of trenching must be regulated by the staple: and that there are some soils not proper for wheat, and evidently improper for trenching, though these are few. He asserts that wheat will penetrate three feet, if the soil permit;

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its weeds and roots. These are covered with the large plough, somewhat narrower than the small one, which runs in the same furrow. He is satisfied with finishing three quarters of an acre in a day....*Editor*.

* The Magothay, Bay-bean, would answer very well, see article CASSIA, CHAMAECRISTA: as also the Lady-pea, and Indian-pea of New-Jersey.....*Editor*.

* See CAREY'S *American Museum*, vol. ix. page 41.

and that some horizontal roots have been measured ten feet. It can hardly be expected that the plants will therefore perfect themselves in a depth of three or four inches.

The advantages of the practice of trenching and deep ploughing, are also detailed by Dr. De Normandie, in his address to the *Burlington Agric. Soc.* (Carey's *Museum*, vol. xii. 191.) and in a late pamphlet by T. Moore, of Montgomery county, Maryland, entitled, "*The great Error of Amer. Agriculture exposed*," p. 72, Baltimore, 1801; Dobson, Phil. price, $\frac{50}{100}$, a work which should be in the hands of every farmer.

The *utility* of *paring and burning*, recommended by Dr. Anderson, is enforced in the last vol. of the "*Trans. of the Board of Agric. of England*," in several papers; from one of which, by the Rev. E. Cartwright, a practical farmer, an extract may be found under the head Paring,]

LAND-DITCHING, or Hollow-draining, is practised chiefly in the counties of Essex and Hartford. It consists in digging both main and side-drains, similar to those generally adopted in draining land: the former are usually made from 22 to 24 inches, the latter from 20 to 22 inches, in depth. The soil is previously ploughed; and the length to which the main drains may be protracted, without a vent, depends upon the situation of the land: when it has a regular declivity, the most proper method will be to carry off as much water as possible, by means of side-drains: but if the ground be irregular, it will be requisite to form additional main-drains, so that every advantage may be derived from the vallies, into which the latter must often be conducted to a considerable extent.

The length of the side-drains varies according to the elevation of the soil: in general, they need not be more than one rod apart from each other; though, in very loose or porous grounds, they may be dug at a distance of one rod and a half. When the trenches are cut to a sufficient depth, they are filled up, and covered in the usual manner with straw and bushes. The expense of this method of draining is computed to be nearly 3*l*. per acre.

Land-ditching, not only carries off the water from wet or marshy soils, but also meliorates stiff loamy clays; which, being thus better enabled to resist the long-continuance of moisture on their surface during the winter, promote vegetation very early in the spring, and the grass is rendered of a superior quality. The weeds, &c. change their colour, and are totally divested of their rankness; the corn also increases both in quality and weight. Another important advantage arising from this practice, is, that it will admit of the soil being ploughed at an earlier period of the spring, and later in autumn; while it may be tilled with greater facility, and kept clear from weeds at a very small expense.

LANGUAGE, signifies the expression of our ideas, and their different relations, by means of articulate sounds;

The acquisition of languages is an object of great importance.... Without entering into a discussion concerning their origin, we shall briefly observe, that the power of speech is not naturally acquired; because, when considering its mechanism, certain positions and mo-

tions of the organs of the mouth, such as the tongue, the teeth, lips, and palate, &c. are necessary for uttering sounds, which cannot be imitated by persons living in a state of Nature, and must, therefore be the effect of *art*. Hence civil society alone could produce a language; and, as the former is not from Nature, or coeval with the animal, it follows that both must have had a beginning.

The same cause that first produced ideas, and made men rational creatures, also rendered them social or political, and in process of time produced all the arts of life: this cause, in the opinion of the late Lord Monboddo, is no other than the *necessities* of human life. These are either the want of subsistence, or of defence against superior force and violence; so that without the operation of one or other of these causes, there never would have been society, language, or arts, among men.

The most easy and correct method of acquiring languages, is, however, of greater consequence than the history of their origin.... Singular as this assertion may appear to many of our readers, it is nevertheless true, that a just model, or plan of teaching, so useful an art as that of speech, to children or adults, has long been, and still remains, a great *desideratum*. And though we are not in possession of a *perfect* system of grammar, yet many excellent treaties have been written on that subject by ingenious men, who have, *individually*, contributed to render the art of speaking and writing more familiar to persons of ordinary conception. Unfortunately, however, less attention has, in general, been paid to the acquisition of modern languages, than to those of the ancients. Hence we may confidently recommend the method pursued by Dr. Egan of Greenwich, on whom the Society for the *Encouragement of Arts*, &c. in 1781, conferred a gold medal, for teaching youth to write and speak Latin in common conversation, both fluently and correctly. His plan is to divest instruction of that harshness, which intimidates juvenile minds, and retards their progress in learning.... And he has succeeded in rendering the hours of amusement subservient to the promotion of the classical part of education, by inducing his pupils to speak Latin with equal ease and precision. To effect this purpose, he prohibits boys of a certain standing, from practising any language except the Latin or French; and a mark is circulated for the prevention of solecisms and barbarous expressions. If a pupil, who has this mark, hear another speak ungrammatically, it is passed to the latter, and he who receives such mark most frequently in the course of the day, incurs a small fine. To avoid this penalty, Dr. E's scholars pay the strictest attention to the choice and arrangement of their words, the construction of their sentences, as well as the style, purity, and harmony of their diction.

Thus a considerable portion of time and expense is saved, independently of the numerous other beneficial consequences that result from this plan, as it may be easily applied to the different *living* languages. Hence it well deserves to be more generally known, and adopted in those schools where years are wasted by the old me-

thod, which is comparatively absurd.

The English language undoubtedly possesses a superior degree of excellence, blended with a greater number of defects, than that of every other nation in Europe....... Bold and energetic, it is admirably calculated alike for history and the drama : at the same time, from its smoothness and copiousness, it is peculiarly adapted for the different branches of poetry. But, with all these advantages, it labours under an infinity of monosyllables, which will ever prevent it from attaining that swelling fullness of sound, which so essentially contributes to produce both harmonious dignity and graceful cadences in literary composition. To this imperfection must be added the letter *s*, which, by its very frequent and inevitable recurrence, communicates to the whole such a general *hiss*, as cannot fail to be unpleasant to every impartial person, who has the least conception of musical harmony.... We have neither room, nor an opportunity of pointing out a remedy for this harshness ; yet if the syllable *en*, which was formerly appended to the plural number, were restored, to its ancient place, we presume that many of the difficulties would be removed ; and that, trifling as this alteration may appear, the language would thus be greatly improved.

LANTHORN, or LANTERN a well-known contrivance, which serves to carry a candle, without exposing it to the air, or otherwise incurring danger.

Lanthorns are usually made of glass, horn, or other transparent matter, for the transmission of light ; but, if they were covered externally with thin wire-work, many accidents might be prevented in stables and barns, as the lanthorns might thus be rendered less liable to injury from external accidents, while the communication of light would not be impeded.

LAPWING, or *Tringa Vanellus*, L. a British bird distinguished by its black bill, crown of the head, crest, and throat ; red legs, black and white wings and tail : it is above 12 inches in length, and weighs about eight ounces.

The female of this bird constructs her nest with a few bents, and deposits four eggs of an olive shade, spotted with black : these are, on account of their delicacy, much esteemed, and sold by the London poulterers for three shillings and upwards the dozen.

During the winter, lapwings frequent fens and marshy places, where they join in numerous flocks : and, though remarkably shy, are then easily taken in nets similar to those employed for catching ruffs. They are not preserved for fattening, but killed when caught : their flesh is very palatable and nutritious.

LARCH-TREE, or *Pinus Larix*, L. one of the most valuable exotics, which was introduced into Britain from the Alps towards the end of the 17th century, and has been lately cultivated with particular attention.

The larch will grow in any soil, but it flourishes most luxuriantly on cold and gravelly lands, or such as are neither too stiff nor too dry; provided its roots can penetrate through the soil to a sufficient depth. It is propagated from seeds first put in a light earth ; and, at the end of two years, the young

plants are usually removed to those spots where they are destined to remain. This useful tree should be transplanted immediately after shedding its leaves: during the first four years, it grows slowly, and seldom exceeds three feet in height; but in the course of 20, it will surpass both in length and girth, a fir-tree 40 years old, at the age of 24, it is, in general, from 50 to 60 feet high; and, in 50 or 60 years, it often attains the height of 120.

The most proper season for felling the larch, is in the month of July; because the liquid which oozes from the tree at that time, is speedily changed into a gummy-resinous matter, so that the wood is not drained so much as at other seasons, but hardens, and may thus be sooner employed.

The larch is of singular utility for various purposes, in which durability and strength are required. Hence it is peculiarly calculated for ship-masts and the building of vessels, or for strengthening the wooden frame-work of bridges: for it is capable of supporting a much greater weight than the oak itself, and almost petrifies under water... It also resists the intemperature of our climate, and is of excellent service for gates, pales, and other works which are exposed to all the vicissitudes of the weather.

Larch timber is equally durable within doors; and houses constructed with it, have a whitish cast for the first two or three years; after which the outside becomes black, while all the joints and crevices are firmly closed with the resin extracted from the pores of the wood by the heat of the sun; and which, being hardened by the air, forms a kind of bright varnish, that has an elegant appearance. Nor is there any wood which affords such durable pipe-staves for casks, while the flavour of the wine is at the same time preserved and improved. It's trunk, when perforated and *tapped* between the months of March and September, yields the purest *Venetian turpentine*, that is of considerable use in medicine.... It's large branches produce small sweetish grains, resembling sugar; and which are known under the name of *manna*, from their possessing similar purgative properties with that drug.

The larch is likewise an excellent nurse to the more tender trees; as it is furnished with several small, pliant branches abounding with leaves; which, from their flexibility, readily yield to the contiguous trees, admit rain more easily than Scotch firs, and receive no injury from inclement snowy winters; when the branches of the latter are frequently stunted, and the trees themselves totally destroyed.

Beside the manifold uses to which this inestimable tree is subservient, we shall mention a few additional facts, chiefly extracted from foreign writers, with the confident hope of promoting its more general culture....From the inner rind or bark of the larch, the Russians manufacture fine white *gloves*, not inferior to those made of the most delicate *chamois*, while they are stronger, cooler, and more pleasant for wearing in the summer...A gummy matter, partaking of the properties of animal glue, and vegetable mucilage, is obtained by a curious process from the sap of this tree; and which greatly resembles the gum arabic of Senegal, though it is of a brown colour; it is known in Russia by the name of

Orenberg Gum. PALLAS informs us, that the untutored natives cut a hole at one side of the trunk, near its root, then burn the wood to the very pith, by applying combustible materials: in consequence of the heat thus generated, the circulating medullary juice descends in drops, which concrete into a transparent gum, forming various fanciful configurations....In countries where the larch-tree abounds, its firm and compact wood (a cubic foot of which, or 144 solid inches, weighs 41 pounds, and exceeds that of the fir in the proportion of 8 to 7,) affords a very superior charcoal: this, likewise, in quantity, measured one-third more than that burnt from the fir-tree; and its specific gravity, on weighing and balancing it with the latter, was as 8 to 5. It is, however, remarkable, that the larch contains more aqueous ingredients than the fir-tree, insomuch that five measures of the oily water collected during the combustion of the former, yielded, on evaporation, only $3\frac{1}{2}$ ounces of pitch; whereas four and a half measures of the latter, produced 4 ounces.....Buildings erected of larch wood, have been observed to remain sound for 200 years; as it is eminently adapted to resist the effects of air and water, while it is exempt from the depradations of the worm; hence it is peculiarly excellent for shingles; but, on account of its combustible nature, it would be advisable to prepare them in the manner directed by Mr. KNOX.....[See article FIRE.] Lastly, the bark and other parts of this profitable tree, have been found, by experiment, to be proper substitutes for that of the oak.

[The fullest account of the numerous good qualities of the *larch*, is to be found in Dr. ANDERSON'S *Rural Essays*.]

LARK, or *Aluada*, L. a genus of birds comprising twenty-eight species, of which the most remarkable are:

1. The *arvensis*, or COMMON SKY-LARK; a long-lived, and hardy bird, mounting high, raising its notes as it soars, and lowering them as it descends. It is remarkable, that this, and the following species, are the only known creatures that sing during their flight. The female sky-lark constructs her nest in fields productive of high grass, or in marshes, on the ground, beneath some clod; forming it of hay, dry fibres, &c. she deposits four or five eggs, and produces young ones three, and often four times in a year. In the neighbourhood of Dunstable, these birds are taken in great numbers, from the 14th of September to the 25th of February; during which time about 4000 dozens are caught, to supply the markets of the metropolis.

2. The *arborea*, or WOOD-LARK, is distinguished by an annual white fillet about the head. It is of inferior size, and its notes are weaker and less musical. This little warbler, when in the cage, often strives to excel the nightingale; and, if not speedily removed from the place where he is suspended, will certainly fall a victim to emulation.

Wood-larks perch on trees, and their whistle resembles that of a black-bird; the female builds her nest on the ground, and furnishes it externally with moss, but internally with dried bent-grass, &c. She lays five eggs, of a dusky colour, interspersed with deep brown spots. The common food of young larks reared in an aviary, is a hen's egg boiled hard, and chopped or

grated very fine, together with the crumbs of bread, and hemp-seed; but, if diseased, a few wood-lice may be given them: a little liquorice, and a blade of saffron, may also be infused in their water, which will contribute to their speedy recovery.

Method of catching Larks....The usual practice of taking these birds is, by *trammels*, or a kind of nets, generally 36 yards in length, and about 6 yards in breadth, having six ribs of pack thread, which are fastened on two poles, about 16 feet long. After selecting the darkest night for this sport, the net is to be drawn over the ground by two men, who frequently drop it, lest they should pass over the birds; as soon as the latter are perceived to fly up against the trammel, it is instantly clapped down, and thus the larks are secured.... This net is also well calculated for catching various other kinds of birds, such as partridges, quails, woodcocks, &c.

LARK-SPUR, or *Delphinium*, L. a genus of plants, consisting of fourteen species, one of which only is indigenous, namely, the *consolida*, or Wild Lark-spur; Field Lark-spur, or Lark's-heel: it grows in corn-fields, and flowers from the month of June to September.

The expressed juice of the petals of this plant imparts a green colour; and with the addition of a little alum, will produce a good blue ink. The seeds are acrid and poisonous. Sheep and goats eat the lark-spur; horses do not relish it; while cows and swine totally refuse it. Bees are remarkably attached to its flowers, which are likewise gathered by the country-people of Germany, cut small, and mixed with tobacco; as they are said to improve its flavour.

LATH, in building, a long, thin, narrow slip of wood, which is nailed on the rafters of a roof, in order to support its covering.

Laths are divided into three classes, according as they consist of different kinds of wood: viz. 1. Such as are formed of *heart of oak*, and which are used only for tiling; 2. *Sap*; and 3. *Deal-laths*; both of which are employed exclusively for ceiling and making partitions. They are farther distinguished, with respect to their length, into *five-feet*, *four-feet*, and *three-feet* laths, though the statute allows only laths of two lengths, namely, those of five, and three-feet: each of these is directed to be an inch and a half in breadth, and half an inch in thickness. For an excellent method of laying laths, so as to make them *fire-proof*, the reader will consult pp. 1 and 2 of this volume.

Laths are sold by the bundle, which is generally called a *hundred*; it should be observed, however, that seven score, or 140, are computed in the hundred for three-feet laths; six score, or 120, in such as are four feet in length; and for those which are denominated five-feet, a full hundred, or five score.

LATH-BRICKS are a particular kind of that article, made in the county of Stafford, and other parts of Britain: they are twenty-two inches in length, and six inches in breadth, being used as a substitute for laths or spars, and supported by pillars in *casts*, for the drying of malt. This excellent contrivance deserves to be more generally known; for, indepen-

dently of the security which lath-bricks afford against fire, they retain heat much longer than wooden-laths; and, after having been once thoroughly warmed, they require a very moderate fire, to preserve the proper temperature.

LATHE, a very useful engine for turning wood, ivory, metals, and other hard substances.

The invention of this instrument is of great antiquity, for, according to VIRGIL, the ancients availed themselves of it, in forming various kinds of vases, which they enriched with figures and ornaments in basso-relievo. It is composed of two wooden cheeks or sides, parallel to the horizon, with a groove between them: perpendicular to these are two other pieces, called *puppets*, constructed so as to slide between the cheeks, having two points meeting the opposite central sides or ends of the article intended to be worked, so as to sustain it: thus, the piece is turned round in both directions, by means of a cord attached to it, fastened above to the end of a pliable pole, and underneath to a treadle or board, which is moved by the foot. To such aparatus, a *rest* is also subjoined, which supports the instrument, and keeps it steady...... This useful machine has lately been much improved, and we had an opportunity of comparing a variety of *lathes* manufactured of steel in the metropolis, and designed chiefly for private use and exercise; among which, for neatness and simplicity, we are inclined to give the preference to those contrived by Mr. HOLTZAPFEL, an ingenious young artist, of Long-acre.

With respect to the manner of applying this curious instrument to the various purposes to which it is adapted, we refer the reader to the article TURNING.

LATTIN, or Latten. See BLOCK-TIN.

[LAUDANUM. *Tincture of Opium.* The occasions for the use of *Laudanum* in families are so numerous, that the utmost certainty with regard to the dose, ought to prevail. This can only be effected by families making this medicine themselves, or by purchasing it of apothecaries of reputation, who will consent to make it agreeable to a prescription given to them. The following is the form prescribed by the *London College of Physicians*:

Purified Opium, ten drachms; Proof-Spirit one pint. Digest for ten days, and then strain.

Dr. DONALD MONROE observes, "one drachm (sixty drops) of the above tincture, contains, by experiment, $3\frac{2}{3}$ grains of opium: so that three drachms of it contains eleven grains: hence if we mix eight drachms of proof-spirit, with three drachms of the above tincture of opium, we form a tincture, each drachm of which contains one grain of opium; if we want a still weaker tincture, we may add eleven drachms more of *proof-spirit*, when we shall have a tincture, each drachm of which contains half a grain of opium."

In most cases, however, it will happen, that this medicine must be purchased, as prepared by the apothecary's particular receipt; and therefore, to prevent the administration of an over-dose, it should be given in small quantities, (say fifteen drops to a grown person), at a time, until the desired effect be produced. A single full dose of 20, 30, or 35 drops, will

frequently disappoint our wishes, by proving either too great, or too small a quantity for the necessities of the system.

Laudanum should always be given in a perfectly bright state: when kept some time, it will deposit a portion of what had been previously held in solution; and being solid opium, will greatly increase the strength of the dose. Such thick laudanum should be marked, and reserved for external applications.]

LAVENDER, or *Lavandula*, L. an exotic genus of plants, comprising seven species; the principal of which is the *spica*, Lavender spike, or Common Lavender: it flowers in the month of July.

This herb may be easily propagated: in March or April, take a quantity of slips, or cuttings, from three to four inches long; having stripped off the lower leaves, plant them in a shady border, four inches apart. If occasionally watered in dry weather, they may be transplanted early in autumn; removing them, if possible, with balls of earth. When they are intended for a crop, it will be requisite to set them in rows two or three feet separate, and at the distance of two feet from each other; but, if destined for the shrubberry, they should be planted singly, at proper distances.

Lavender is employed both for medicinal and domestic purposes. The flowers should be gathered in July, when the spikes being cut off close to the stem, in a dry day, and tied up in bundles, are much esteemed, not only for their grateful odour, when deposited in chests, or boxes, among linen; but chiefly for preventing the depredations of *moths* and other insects. By distilling these flowers, they yield a compound spirit, which is of considerable service in palsies, vertigoes, lethargies, tremors, &c. The distilled oil possesses the power of destroying the *pediculi inguinales*, and other cutaneous vermin. If soft, spongy paper be dipped in this oil, and applied at night to the parts infested with the insects, they will, according to Geoffroy, be found dead in the morning.

LAVENDER-THRIFT, or Sea Lavender, *Statice Limonium*, L. an indigenous perennial plant, growing on the sea-shore; in salt-marshes; and the fissures or clefts of rocks, near the sea-coast: it is in flower from July to September.

This vegetable deserves the attention of *tanners*, on account of its red, astringent root, called by the Russians, *Kermeck:* and from which they prepare that valuable kind of leather distinguished by its peculiarly strong, though not ungrateful odour, and on the Continent termed *Juften*.......Guldenstaedt, in his *Travels through Russia*, observes, that on the coast near Azof, he met with a tan-work in which the root of the Sea-Lavender was employed in dressing the hides of oxen, both for the celebrated Russia, and common sole-leather. The roots are previously dried in the sun, and finely pulverized: next, the hides are cleaned with ashes obtained from the roots of the oak, and suffered to lie a month in this preparatory lixivium; after which they are immersed into the liquor made of the pounded roots before mentioned. He adds, that there is not the least doubt of this root proving a complete substitute for the more expensive oak-bark.

LAUGHTER, a sudden and

convulsive expression of mirth, peculiar to the countenance of man; and which is occasioned by some object that surprizes the fancy.

This emotion, however, more frequently arises from an unexpected disappointment of the mind, while its attention is arrested by an object apparently of great importance; but suddenly terminating in ridicule, or insignificance.... With respect to its influence on the body, moderate laughter is very beneficial; for it contributes to promote the circulation of the blood through the lungs, and has frequently removed colics, pains in the stomach, and similar complaints. Various instances have likewise occurred, in which deep-seated ulcers of the lungs and liver, that could not be relieved by any remedies, bursted, and were perfectly cured by a fit of laughter, artificially excited. Beside the pleasing sensations with which it is accompanied, this affection powerfully operates on the organs of digestion, and greatly contributes to the assimilation of food.

Laurel. See Bay-tree.

LAXATIVES, or Aperient Medicines, are such as promote a loose state or disposition of the bowels, for the more easy and regular evacuation of the feces. On account of the gradual effect which *laxatives* produce on the body, they are distinguished from the more powerful or drastic purges, which operate more speedily.... Hence, with the former intention, castor-oil, or cold-drawn linseed-oil, are alike calculated to afford relief, especially if they be taken in small doses, such as a table-spoonful every hour, with a draught of warm ale, till they mildly operate. As, however, the difference between these, and the more brisk cathartics, greatly depends on the manner of administering them, we shall communicate a few observations on both, under the article Purgatives.

LAYERS, in horticulture, denote certain tender shoots or sprigs of trees, which are buried or deposited in the ground, till they have taken root; when they are separated from the parent stock, and become distinct plants.

The method of propagating trees by layers, is performed in the following manner: A small cut or slit is first to be made in the branches, which should then be *laid* about half a foot deep, in light, rich mould, and gently watered; but, if they do not retain the position in which they were placed, it will be necessary to fasten them down with wooden hooks.

The best season for propagating layers is, for evergreens, towards the end of August; and for deciduous trees, in the beginning of February: after having taken root, they may be separated from the parent stock, and planted out in the succeeding winter. Some horticulturists, however, recommend stripping off the rind or bark; others direct the branch to be twisted, previously to setting it in the ground; but these operations are not essentially requisite, as the layers will flourish, if proper attention be paid to water them regularly during their early growth.

[A better way is to inclose a branch in a flower-pot or keg divided, and filled with earth, having previously made a circular incision through the bark of the branch down to the wood. The keg or pot must be supported by a frame, and may be thus watered at plea-

sure, and preserved from that decay which frequently attends layers in the earth. A bearing branch of a fruit-tree, it is said, will thus be brought to produce fruit in one year. See article FRUIT.]

LEA, a measure used in some parts of England, to express a certain quantity of yarn. The statute 22 CAR. II. directs a *lea of yarn*, at Kidderminster, to contain two hundred threads, on reels that are four yards in circumference.

LEAD, one of the imperfect metals, is of a dull white, inclining to a blue colour; and, though the least ductile and sonorous, it is the heaviest of metallic bodies, excepting mercury, gold, and platina.

Lead is found in various countries; but it abounds in England, especially in the counties of Derby and Devon. When dug out of the earth, it is crushed in a mill, and smelted in a manner similar to iron-ore, of which we have already treated.

A patent was granted in 1779, to Mr. W. ROE, for his new-invented process of extracting *sulphur* from poor lead ores, and rendering these as valuable, and saleable, as any other ores of this metal. As this patent is now expired, and the principle of the inventor is equally simple and ingenious, we trust it is, or will be, generally adopted in our smelting-houses: the inquisitive reader will find it fully specified in the 6th vol. of the "*Repertory of Arts and Manufactures.*"

Lead is employed in making various vessels, such as cisterns for water, large boilers for chemical purposes, &c. Considerable quantities are likewise used in the casting of shot, for which a patent was granted in 1782, to Mr. WILLIAM WATTS, in consequence of his invention for granulating lead solid throughout, without those imperfections which other kinds of shot usually present on their surface.... The patentee directs 20 cwt. of soft *pig-lead* to be melted in an iron pot, round the edge of which, a peck of coal-ashes is to be strewed upon the surface of the metal, so as to leave the middle of the latter exposed. Forty pounds of *arsenic* are next to be added to the uncovered lead, and the pot closely shut; the edges of the lid being carefully luted with mortar, clay, or other cement in order to prevent the evaporation of the arsenic. A brisk fire is then kindled, so that the two substances may be properly incorporated; when the metal ought to be skimmed and laded into moulds, that it may cool in the form of ingots or bars, which, when cold, are called *slag*, or poisoned metal....20 cwt. of soft pig-lead, (according to the quantity of shot intended to be manufactured) are next to be melted in the manner above directed; and, when it is completely liquefied, one of the ingots or bars of slag must be added: as soon as the whole is combined, a small quantity of the liquid metal is to be taken out with a ladle, and dropped from a height of about two feet into the water. If the shot be not perfectly round, it will be necessary to add more slag, till it drops in a globular form. The metal is next skimmed, and the scum poured into an iron or copper frame perforated with round holes, according to the size of the shot designed; the scum is then to be squeezed while soft, through the frame, into which the liquid should be poured, and dropped through the holes. For the small-

est shot, the frame must be at least ten feet above the water, and for the largest, about 150 feet; the height being increased or diminished, in proportion to the size of the shot.

There are various other purposes to which lead is usefully applied: it unites with almost every metal, except iron; but, if both metals be exposed to the fire in a proper vessel, the former scorifies the latter, and melts with the calx into a dark coloured glass. On account of this property of vitrifying the imperfect metals, lead is often used in the purification of gold and silver, neither of which combine with it, but remain pure on the bottom of the cupel. It is also frequently employed by unprincipled dealers, for correcting the rancidity of damaged rape-seed oils, and those of almonds or olives. This dangerous abuse may be discovered, by mixing a small quantity of the suspected oil with a solution of orpiment, or liver of sulphur, in lime-water: as, on shaking the two liquids together, and suffering them to subside, the oil will, if it be adulterated with lead, acquire an orange-red colour; but, if it be pure, it will assume only a pale yellowish shade. A similar pernicious fraud is practised with acid wines, which dissolve a sufficient portion of lead, so as to acquire a sweetish taste: this may be detected by means of the same solution, which forms the chief ingredient of the different liquid tests sold for that purpose.

Lead, when taken or inhaled into the human body, is productive of various fatal disorders, to which miners, potters, and all other persons concerned in its manufacture, are peculiarly subject. Hence, culinary vessels, or other domestic utensils made of this metal, are highly objectionable, especially if they are intended to contain cyder or other acid liquor. To this cause the *Devonshire colic* is justly attributed; for great quantities of cyder are, in that county, kept in vessels, consisting either wholly of lead, or such as are soldered with this pernicious metal. The *dry belly-ach* of the West Indies is of the same origin, and is occasioned by distilling rum through leaden worms.

In these dreadful complaints, the patient is siezed with an acute spasmodic pain in the stomach, which extends gradually to the whole intestinal canal: the bowels are frequently inverted and drawn towards the spine, so as to render the application of clysters impracticable. At the same time, a most obstinate costiveness prevails; and the affection at length terminates in palsy, or in fixed contractions of the limbs.

For the cure of this painful malady, gentle clysters and laxatives may at first be administered; but, if these are not attended with beneficial consequences, Dr. PERCIVAL decidedly recommends the internal use of *alum;* which, in slight cases of the Devonshire colic, has generally effected a cure, when used to the extent of fifteen or twenty grains every fourth or fifth, or sixth hour. Balsam of Peru, in doses of forty drops, to be taken two or three times in the course of the day, has also been advantageously prescribed; at the same time, castor-oil, or other mild laxatives, conjoined with gentle opiates, have greatly contributed to afford relief....The patient's diet ought to consist of nourishing

broths, panada, and gruel, or similar light dishes.

In whatever form lead may be introduced into the human body, it is equally deleterious and fatal, whether its vapours be inhaled through the lungs, absorbed through the pores of the skin, or particles of the metal be taken into the stomach. The only effectual antidotes to this insidious poison are, antimonial emetics; and after them, the internal use of liver of sulphur, together with vegetable oils, both externally and internally, should be liberally continued.

RED-LEAD, or *Minium*, is a calx of lead of a lively red colour, which it acquires by slow calcination and reverberation. Its preparation is as follows: A quantity of lead is first burnt in a furnace, till it is converted into a kind of litharge, being stirred continually with an iron spatula, while it is melting: it is then ground in a mill to a fine powder, after which it is again put into the furnace and stirred as before, when it assumes first a blackish hue, then a yellow cast, and at length becomes of a deep red colour. While this operation is performing, the greatest caution is requisite to keep the fire at a certain height, in order to prevent the mater from adhering, and running together.

The bright colour of minium would render it a valuable pigment, if it could *stand* either in oil or in water: but, being apt to become black, it is seldom employed, except as a ground for vermillion.... The genuine quality of red-lead may be ascertained by the brightness of its colour; and, as it is frequently adulterated, such fraud may be easily detected, by mixing equal quantities of minium and charcoal-dust in a crucible, and placing the whole over a fire sufficiently intense to melt lead. When it has continued for some time over the flame, it must be removed; and, when cold, stricken against the ground. Thus, the red-lead will be reduced to its metallic state; and, when freed from the charcoal, its diminished weight will shew the proportion of adulterated matter.

In medicine, red-lead is only employed externally: it obtunds the acrimony of humours; mitigates inflammations; and, if judiciously applied, is of excellent service in cleansing and healing old ulcers.

WHITE-LEAD, or *Cerussa*, is prepared by placing a vessel containing vinegar in a moderately warm place, and over which thin plates of lead are suspended, so that the vapour arising from the acid may circulate freely round the plates. A white powder settles in the course of two or three weeks, on the surface of the metal, which is now removed into another room, and passed beneath a screen, and pair of rollers, for separating the corroded from the sound part; that is again suspended, till it is wholly converted into a white calx; when it is called cerusse, or white-lead. During this operation, a considerable portion of fine dusty particles settles on the skin and lungs of the workmen, to whom it is attended with the most pernicious consequences. In order to counteract such injurious effects, Mr. WARD, in the year 1795, laid a machine before the *Society for the Encouragement of Arts*, &c. and was consequently rewarded with their gold medal. It consists of a vessel 12 feet in length, six feet wide, and

three feet ten inches deep, in which a pair of brass rollers is fixed, one above the other: the centre of these is about ten inches beneath the top of the vessel; and, one inch lower, a covering of oak-boards or *riddles*, about an inch thick, is inserted in a groove on the inside of the vessel, so that it may be occasionally removed. ... These boards are perforated in the centre with several holes, each of which is about five eighths of an inch in diameter.

Previously to the working of this machine, the vessel is filled with water, about three inches above the oak-boards; when the whole of the lower brass-roller, and half the upper roller, are completely immersed: the lead on being corroded, is passed through these cylinders; and, by stirring the metal with a copper rake, the cerusse is forced through the riddles, and the blue or uncalcined metal remains above. Thus, white-lead is prepared; and by such useful contrivance, the minutest particles are prevented from ascending, and consequently their pernicious influence on the health of the workmen is effectually obviated.

Among the different patents registered for the manufacture of white-lead, we shall mention only those granted to Mr. JAMES TURNER, in 1780; to Mr. RICHARD FISHWICK, in 1787; and to the Earl of DUNDONALD; of which the reader will find ample specifications in the different volumes of the "*Repertory*," &c. A patent was also granted in 1799, to Mr. JOHN WILKINSON, for a new method of making white-lead: he directs any quantity of litharge to be ground very fine in sea-water, or other saline mixture; and by repeatedly triturating, washing, and bleaching it, the patentee asserts, that white-lead of the best quality may be obtained. No vinegar, or other acid mixture, is necessary in this process; as levigation, repeated ablutions, and drying, are amply sufficient, provided more time be allowed for the operation, by the medium of the common atmosphere.

The last patent we shall notice, was obtained at the commencement of 1801, by Mr. THOMAS GRACE, for a contrivance of making an acid to corrode lead, and also for a new process of manufacturing white-lead. In either respect, however, the usual method is but little varied: the acid required for the purpose is generally prepared by fermenting molasses and water, together with other materials, which are well known to vinegar-makers, and which it would be needless to detail. Among other articles, he makes economical use of the *sours*, or water in which wheat has been steeped for converting it into starch; as likewise of the water employed for distilling oil of turpentine; both these liquids possess a considerable portion of acidity, which has hitherto been generally wasted.

All the different methods of preparing white-lead, however are extremely pernicious, as well to the manufacturer as those who use vessels that are glazed with it. Hence we have already under article GLAZING, pointed out proper substitutes for this destructive metal, which were invented by foreign chemists; and shall, therefore, conclude with an account of the patent granted in 1796 to Mr. JOHN KEELING, for his contrivance of a substitute, both for red

and white-lead, in glazing earthen wares, glass, enamel, &c. He directs any quantity of lead ore, to be put into a reverberatory or other furnace, and to be roasted till it become of a *white-heat*, during which process the metal will emit a considerable portion of fumes. The fire must be continued till about an hour after the vapour is dissipated; and, when the mass grows cool, it is to be removed from the furnace, and ground with water to a fine liquid state, when the other ingredients, usually employed in making *glazes*, may be added; and the preparation will be complete. Thus the injuries occasioned to the workmen, by the dusty particles which settle upon their skin and lungs, will be effectually prevented; but this *succedaneum* does not remove the poisonous qualities of the metal in the glazing of earthen-ware.

White-lead is employed in painting, and furnishes a tolerable white.....See articles COLOUR and PAINT.

Cerusse is likewise used in surgery; and, on account of its cooling, drying, and astringent properties, is of considerable service when sprinkled over running sores or ulcers.

BLACK-LEAD, or *Plumbago*, a genus of inflammable substances, found in various parts of the world; but most abundantly at Borrowdale, in Cumberland; whence Britain, as well as the greater part of Europe are supplied with this article.

Pure black-lead is of a very deep colour: when newly cut, it presents a blueish-white cast, and shines like common lead. It is insoluble in acids; but, if it be put into a vessel placed over a strong fire, and exposed at the same time to the air, it is almost entirely volatilized, depositing only a little iron, and a small portion of siliceous earth.

Black lead is chiefly used in the manufacture of pencils for drawing; and though paper can be marked with them for a time, yet every trace may afterwards be totally rubbed out by means of soft bread, or elastic gum. In forming such pencils, the lead is divided into long pieces, and fixed into square grooves, cut in cedar or other soft wood: another piece is then glued over, and the whole worked into thin cylinders. A coarser kind of pencils is manufactured, by mixing pulverized black-lead with sulphur; which, however, are calculated only for carpenters' marks, or very coarse drawings. The powder of black-lead also serves to cover razor-straps; and considerable quantities of it are used for imparting a bright gloss to cast-iron grates or stoves. It may also be advantageously applied to smoothen the inner surface of wooden-screws, packing presses, and other wood-work that is subject to frequent friction, for which purpose it is far superior to greasy, soapy, or oily matters.

LEAD-WORT, or *Plumbago*, L. a genus of exotic plants, consisting of four species; the most remarkable of which is the *Europæa:* its root is perennial, strikes deep into the ground, and grows naturally in the southern parts of Europe.

This very acrid and poisonous vegetable may be propagated either by parting the roots, or by the seeds; as it will grow in the open air of our climate, and is far from being an useless plant. Its root

was formerly kept in the shops, and is still occasionally employed for drawing blisters, and exciting salivation. The leaves of lead-wort, according to BECHSTEIN, are vulnerary, and may be advantageously applied to the back of horses injured by the pressure of the saddle, or for healing other sores.

LEAF, a distemper incident to lambs, when about a week or fortnight old. It has received this appellation; as the creatures feed on oak and howthorn leaves, which cause them to foam at the mouth, reel and stagger, so that they suddenly drop down and expire.

Although we are not acquainted with any certain remedy for this malady, yet we believe it may be cured in its early stages, by giving the young animals thus injured, a mixture of equal parts of oil and vinegar, in frequent small draughts poured into the throat, and at the same time administering clysters composed of similar ingredients.

LEATHER, the skins of various quadrupeds dressed in a particular manner, for the use of manufactures. See CURRYING and TANNING.

Dyeing of Leather: Different colours may be imparted to leather, according to the uses for which it is designed. Thus, a *blue* is given by immersing the piece for the space of twenty-four hours in urine and indigo, after which it is boiled in alum; or this colour may be communicated by tempering the indigo with red wine, and steeping the skins in the mixture.

A *red* colour is obtained, by first washing the skins, which are then soaked for the space of two hours in galls, wrung out, and immersed in a liquor prepared by a solution of privet (*Ligustrum vulgare*, L.), alum, and verdigrease in water; when they are steeped in a dye made of Brazil-wood boiled with ley. In order to communicate a *purple*, the skins are wetted with a solution of Roman alum in warm water; and when dry, they are rubbed by the hand with a decoction of log wood in cold water.

Leather acquires a *light-green* tinge, by applying to it sap-green diluted with boiled alum-water..... a *dark green* cast is communicated by means of steel-filings and sal ammoniac, steeped in urine for a considerable time, and well rubbed into the skin, which is then to be dried in the shade.

A *yellow* colour is given, by anointing the skin with a decoction of aloes and linseed-oil, previously strained: or, by immersing it in a solution of dyer's-green-weed.... Lastly, if fustic-berries be boiled in alum-water, and the skins dipped in the liquor, they will acquire a *light orange* shade; but, if a deeper hue be required, it will be necessary to substitute turmeric for the berries. For an account of the preparation of red, yellow, or other *Turkey leather*, we refer the reader to the article MOROCCO.

Leather being an article of extensive utility, especially for shoes and boots, various processes have been contrived for rendering it *water-proof;* we have already stated a simple method to this effect (vol. i. article BOOT); and, that our readers may become fully acquainted with this interesting branch of economy, we shall now give a supplementary account of the different preparations, &c. invented for that purpose.

A patent was granted in 1794, to Mr. JOHN BELLAMY, for his

new invented method of making all kinds of leather water-proof...... For this purpose, the patentee has contrived two compositions, which are prepared in the following manner:

First method: One gallon of nut-oil, and an equal quantity of poppy-oil, are to be mixed with three gallons of linseed-oil; or, one gallon of nut, or poppy-oil, may be added to three of that expressed from linseed: or, two gallons of the latter may be combined with one pint of nut, and a similar quantity of poppy-oil. These ingredients (in the proportions above mentioned, or such as the nature of the oil may require) are to be poured together in an iron pot, and placed over a gentle fire: to each gallon of oil must be allowed one pound of white copperas, sugar of lead, colcothar, or any other drying substance. The whole is to remain for the space of six or seven hours over such a degree of heat, as it will bear without rising, till it become sufficiently dry; when it may be taken off; and, as soon as it is cool, the compound will be fit for use.

Second method: Gum resin, one pound; pitch, half a pound; tar and turpentine, of each four ounces, are to be added to one gallon of the oils prepared according to the first method: these ingredients are to be well mixed with the oils, first by gently heating the whole mass, then increasing the fire, till the whole become thoroughly incorporated. The patentee specifies various proportions, in which the ingredients may be used; but experience will be the best guide to ascertain them.

When the oils, prepared conformably to the first method, or the gums, &c. according to the second, are sufficiently cool, Mr. Bellamy directs a brush to be dipped in the preparation, which should be rubbed into the leather. As soon as that article is thoroughly impregnated, it ought to be laid on an even board, and the superfluous matter removed from its surface. With respect to sole leather, or similar thick substances, he observes, that they should first be gently warmed; the composition is then to be applied till they are fully saturated; and, after being properly dried in a warm place, they will be ready for use.

In the *Memoirs of the Academy of Sciences of Turin*, for 1789, we meet with an interesting communication by M. de S. Real; on the means of rendering leather (especially that destined for soles) impermeable to water, without diminishing its strength. This object, he conceives, may be effected, without any alteration in the usual method of tanning, by the common operations of currying; provided the skins be compressed in certain heavy rollers, after being previously immersed in beef-fat, or oil. The additional greasing, and pressing, will not greatly increase the price of sole leather; which, after being a whole year in tanning, imbibes water in a much smaller proportion than cow-leather, when dressed with fat. We regret that our limits do not permit us to specify the very ingenious experiments made by M. de St. Real; as we are convinced they will contribute to improve the art of tanning.

Another method of preventing leather from being penetrated by water, consists in exposing it with the flesh-side towards the fire: af-

ter which, a coat of warmed tar is to be applied with a proper brush, three or four times successively, according to the thickness of the leather, till the liquid matter penetrate through the whole skin. The durability and strength of shoes, &c. will be considerably increased, if, in laying on the last coat of tar, they be sprinkled over with a small quantity of fine iron-filings, which will, in a manner, fill up the pores of the leather. Lastly, shoes may be rendered impermeable to moisture, by occasionally rubbing the soles with hot tar; thus the feet may be preserved dry and warm; an important object in this climate, especially during the winter season.

[LEATHER-WOOD. See DIRCA PALUSTRIS.]

LEAVEN, strictly signifies *sour dough*, which acquires its acidity, when preserved after kneading flour with yeast, in order to ferment a larger quantity of paste..... It is a very imperfect substitute for *yeast*; and, as it communicates to the bread an astringent taste which few persons relish, it ought to be used only where barm cannot be procured. As, however, the latter ferment is sometimes difficult to be obtained, especially during the winter, we shall communicate the most simple methods of preparing as well as of preserving it, under the article YEAST.

LEAVES, in botany, are defined by LINNÆUS to be the organs of motion, or muscles of a plant: according to Dr. DARWIN, they constitute the lungs of each individual bud. See BUD.

Leaves are of a deeper green colour than the foot-stalks on which they stand; being formed by the expansion of the vessels of such stalks that produce several ramifications; mutually intersecting each other, and thus making a kind of net: the meshes of which are filled up with a tender porous substance, variously called the *pulp*, *pith*, or *parenchyma*. This net is provided, chiefly on the surface of the leaf, with a great number of porous or absorbent vessels, which are destined to imbibe the humidity of the air. The upper surface serves as a defence to the lower; and so essential is this disposition to the vegetable economy, that, if a branch be inverted so as to destroy the natural direction of the l aves, these in a short time, will spontaneously resume their former position.

Leaves, therefore, are not merely ornamental to plants, but contribute in a very considerable degree to promote vegetation: thus almost every class of the vegetable creation is furnished with them, excepting mushrooms, and one or two other productions of the earth. Indeed, if any tree be deprived of its leaves, it cannot shoot vigorously; and if it be totally divested of them, it speedily perishes. When, however, vegetation ceases, these organs of respiration and inspiration become superfluous; hence there are but few plants furnished with leaves throughout the whole year; the greater part is entirely deprived of them, and remains naked during the winter, producing new foliage with each returning spring.

The utility of leaves, in an economical respect, is very great, even after they cease to be essential to vegetation. Hence they should not be suffered to rot upon the ground, but carefully gathered in autumn, then exposed to a dry air, frequently turned, and thus made subser-

vient to various useful purposes.... Such leaves furnish an wholesome winter fodder for cows and sheep, either of which animals devour them eagerly. With this intention, they may be dried in a similar manner, and even mixed, with hay; and, if properly kept free from moisture, they may be easily preserved throughout the winter.

Nor are the leaves of vegetables, especially those of beans, less serviceable as a *manure*, for clay-soils, because the lower ones are very substantial, and yield, in the opinion of Dr. DARWIN, a considerable portion of carbonic acid: hence it may be explained, that bean leaves, by continually dropping on the surface of the land, supply the earth with carbon, and thus render it more nutritive to such vegetables as may afterwards be cultivated. In this respect, they are greatly preferable to sheep's or cow's dung, because they never stock the soil with weeds, the roots or seeds of which are frequently propagated by the compost of ordinary dung-hills.

The leaves of trees may also be advantageously substituted for saw-dust, in wine-cellars; and for horse-litter, or tanners'-bark, in hot-beds, for which they are eminently calculated; and, if trodden down closely, and properly moistened, they will gradually ferment, while their heat is more uniform and permament than horse-dung: besides, there is no danger of burning or suffocating the plants in the frame. Vegetable foliage, likewise, affords an useful material for the stuffing of beds, bolsters, mattresses, and cushions. But, to prevent them from crumbling into dust, when frequently shaken, a correspondent, in the 1st vol. of the *Museum Rusticum et Commerciale*, observes, that they should be moistened while drying; as their contexture will thus be rendered more tough and elastic: we are inclined to recommend, with this intention, a weak solution of glue or isinglass. They certainly merit a fair trial; and, as we have no doubt of their salubrity or softness, they might be beneficially employed by the poor, who may gather and prepare them with little trouble or expense.

Lastly, the leaves of the oak, ash, and alder, have lately been substituted for their respective barks, in the tanning of leather. Concerning the physical properties of leaves, in general, we are silent; as we treat of the more valuable medicinal plants in their alphabetical series; but we cannot conclude this article, without stating an ingenious remark of Dr. DARWIN: who is of opinion, that after their bitter particles have been extracted in a hot-bed, the leaves may be selected and converted into a spirituous drink, similar to small beer, without possessing any disagreeable flavour: there is every reason to believe that such object may be effected by proper management; and the drink thus produced will doubtless be more wholesome than the adulterated liquors, which are imposed upon the public by designing and avaricious persons.

LEECH, or *Hirudo*, L. a genus of insects comprising several species; the most remarkable of which are:

1. The *medicinalis*, or MEDICINAL LEECH, from three to four inches in length: its body is of a dark brown colour, with six yellow spots on the back; and a similar yellow line on each side, (though in some seasons, these distinguishing marks are rather imperfect,

and almost totally disappear): its head is smaller than the tail, and adheres very firmly. This species is viviparous, inhabits clear running waters, produces in July only one young insect at a time, and is valued for its use in drawing blood.

2. The *sanguifuga*, or Horse-Leech, which inhabits stagnant waters, and is larger than the preceding; its skin is smooth and glossy; the body is depressed; the back is of a dusky colour; and the belly of a light green, with a yellow lateral margin.

3. The *Geometra*, or Geometrical Leech, is only 1½ inch long, and has a smooth, glossy skin, of a dusky brown colour, but in some seasons is greenish, spotted with white. When in motion, its back is elevated, so as to form a kind of ridge, and it then appears to measure the space it passes over, like a compass; its tail is remarkably broad; and the insect holds as firmly by it, as by the head. This species is commonly found attached to stones in shallow running waters; and it likewise fastens itself on trout and other fish, after the spawning season.

The medicinal leech is the only one used for local bleedings. It may be applied with great safety and advantage, especially for obstinate head-aches arising from fulness of blood, as well as in many cases of external inflammation, with a view to extract the thick and superfluous humour with which the vessels are overcharged. If the leech will not readily fix itself, a few drops of milk may be rubbed on the spot where it is to perform the operation; or a little blood may be drawn, by making a slight puncture, after which it will immediately settle. When employed for relieving the piles, or to extract blood from the gums, it is requisite to secure the insect with a piece of rush to prevent it either from creeping into the anus or gullet, in which cases it would occasion great distress, in the stomach or intestines. To induce the leech to quit its hold when it adheres longer than required, oil of tartar, volatile alkali, pepper, or acids, are occasionally employed; though a little common salt, strewed on its head, will answer the same purpose. On the contrary, if it be intended to draw a larger quantity of blood, the tail of the leech should be cut off; in consequence of which it continues to draw blood, in order to repair the loss it has sustained. The discharge occasioned by the puncture of a leech, is easily stopped with brandy, vinegar, &c. or may be kept open by applying warm fomentations.

As the geometrical leech often occasions great damage among trout and other fish, it has been recommended to throw a little salt water into the pond; but we doubt whether this expedient, by remedying one evil, would not be productive of still greater injury, by destroying the fish.

LEEK, or *Allium porrum*, L. a well-known vegetable, the native place of which is at present unknown, though it has long been cultivated in Britain.

The leaves of this plant possess a flavour similar to that of onions; affording a constant dish at the tables of the Egyptians, who chop them small, and eat them with their meat. They are also in great esteem among the Welch; and their general utility as a wholesome pot-herb, renders them a valuable culinary spice. For the proper

method of cultivating the leek, see ONION

LEG, the lower extremity of animals, which serves both for their support and motion: it is generally divided into three parts; 1. the *thigh*; 2, the *leg*, properly so called; and, 3. the *foot*.

The human legs are subject to few complaints, except the common ulcers, the proper treatment of which we propose to state under that article. They are likewise apt to be sprained, fractured, or broken; in which cases great caution is requisite; but as those accidents are briefly discussed in their alphabetical series, the reader will consult the articles FRACTURES and SPRAINS. See also BANDY-LEGS.

LEGUMINOUS VEGETABLES. See PULSE,

LEMON-TREE, or *Citrus Lima*, L. an elegant evergreen, indigenous in Persia, rising from 5 to 10 feet in height, producing beautiful large leaves, with a profusion of sweet flowers in the spring and early in summer; which are generally succeeded by an abundance of fruit, that sometimes arrives at tolerable perfection even in Britain.

The culture of this plant is, in all respects, similar to that of the CITRON; for an account of which we refer to the 2d volume.

LEMON-JUICE, an agreeable acid, obtained from the fruit of the lemon-tree. This juice, as well as that of the citron, and orange, is of considerable utility in medicine.... Sir JOHN PRINGLE highly praises its efficacy in the sea-scurvy; it is also frequently used for neutralizing alkaline salts in the preparation of saline draughts. The yellow peel of lemons has a more concentrated aromatic flavour than that of the orange; and like that of the citron, is often candied, and sold under the name of *sweet-meat*. The dried peel is a good stomachic, promotes the appetite, and imparts warmth to the whole frame; but it should not be combined with spirituous liquors in a *fresh* state, as it renders the punch or negus still more heating and hurtful, by its highly inflammable oil; which is, therefore, employed chiefly by perfumers. The juice, as well as the oil of lemons, may be usefully combined with the saccharine and tartaric acids, in the form of *laxative powder*, by the following easy process: Half a pound of refined sugar should be rubbed on the peels of two lemons, till the yellow part is entirely consumed; then the sugar is to be triturated in a glass or marble mortar; the juice of the same lemons dropped on the mass, and the whole suffered to stand in a glazed vessel, till it become sufficiently dry to be again reduced to powder. Eight ounces of pulverized crystals of tartar are now to be incorporated with the former: a few small tea-spoonfuls of this mixture, in half a tea-cupful of spring water, taken at night, or an ounce of the powder given in divided doses through the day, generally produce a mild laxative effect, in costive habits.

Lemon-juice is one of the most cooling and antiseptic vegetable productions: it ought to form an article of the side-board, as well as the medicine-chest; for it improves the taste, and corrects the putrid tendency of animal food in the summer. Hence lemonade affords a grateful and cooling beverage for febrile patients: but it should

be remarked, that the acid of lemons must never be freely given to persons, whose breast or respiration is affected.

[In England, the "*Essential salt of Lemons*" is sold to make punch, and to take out ink-spots and iron-moulds. This essential salt is the acid of tartar procured thus :....

Boil thirty-two ounces of white tartar, (or cream of tartar,) in ten pints of water in a pewter vessel. Then add about nine or ten ounces of pounded chalk or whiting, till the effervescence ceases ; the calcareous earth combines with the acid of tartar, and sets free the alkali, which remains in the solution. Wash this precipitate well. Then add eight ounces of strong oil of vitriol, diluted with about one gallon of water. This should be done in a glazed earthen vessel. The vitriolic acid, being placed in a warm place for twenty-four hours, decomposes the tartareous selenite, and forms *gypsum*, with the chalk, and the *liquor* contains disengaged acid of tartar : evaporate, and you obtain the acid in chrystals. A little lemon-peel squeezed on it makes it pass for salt of lemons ; this rubbed on ink-spots acts like other acids, and takes them out.... The Editor is indebted to T. Cooper, Esq. of Northumberland, for the above.]

LENITIVE Electuary a preparation kept in the apothecaries' shops, and consisting generally of two parts of pulverized senna ; one part of coriander seeds in powder, incorporated with four parts of the pulp of tamarinds ; a similar portion of prunes ; and a sufficient quantity of simple syrup, so as to reduce the whole into an electuary.

It is chiefly employed as a gentle aperient in doses of one tea-spoonful, taken frequently in the course of the day; but, as it is apt to become mouldy, and to lose its efficacy if kept too long, it ought to be newly prepared, and may be more advantageously employed as a vehicle for administering the more active medicines. Nor should this compound be indiscriminately swallowed by the lower classes of people, who thus cloy their stomachs on every occasion, without knowing whether it be a proper medicine for their complaint.

LENTIL, or *Ervum Lens*, L. an useful exotic vegetable of the pulse kind, that has long been cultivated in Britain.

It is propagated from seeds, which are either sown in the proportion of from one bushel and a half to two bushels broad-cast, or are drilled in rows one foot and a half apart, in order that the intermediate soil may be properly cleaned with the Dutch hoe. Sometimes, however this vegetable is put in the ground together with oats or barley, at the rate of one bushel of the latter to two bushels of the former.

The lentil is an annual plant, growing to the height of about 18 inches, and producing pale purple flowers, which are succeeded by small flat pods, containing two or three round seeds. These are frequently used in soups, the flavour of which is thus much improved : the plant itself affords an excellent fodder for cattle. When, however, lentils grow among oats or barley, they should be cut while in full sap ; for, if well dried and preserved, they afford an inviting food, though of a heating and flatulent nature. Nor is the fruit itself more wholesome to mankind ; and Bechstein observes, that it

is hurtful, nay, sometimes fatal to horses.

There is another kind of lentil cultivated in this country, under the name of *French Lentil* or *Tills*. It is in every respect a plant twice as large as the preceding, and is supposed to be a distinct species. It is raised from seeds, which are sown in March, in a soil that bore corn in the preceding year, and has been once ploughed. Manure is not absolutely necessary, though it will greatly increase the crop; which is said to be very copious, and may be mown several times in one season.

The stalks and foliage of this kind of lentil, furnish an agreeable and wholesome food to horses, sheep, and particularly to cows: while they considerably increase the quantity, and improve the quality of their milk. Its long and numerous pods ripen late in autumn, and produce a new species of pulse, which may be dressed in the same manner as the common lentils: in a fresh state, they may also be used as an excellent ingredient in soup; and, when dry, they are eagerly eaten by poultry. The dried herb, likewise, furnishes a good winter fodder for cattle; and, as this vegetable thrives on the poorest land, it deserves to be more generally cultivated.

LEOPARD's-BANE, or *Doronicum*. L. a genus of plants comprising seven species; the principal of which is the only indigenous one, termed *Pardalianches*, Great Leopard's-bane, or Wolf's-bane, growing on the banks of rivers, and in the Lowlands of Scotland; it produces yellow flowers in the months of May and June.

This plant delights in a moist soil, and a shady situation: its spreading roots multiply so rapidly, and the seeds, if carelessly scattered about the land, produce plants so abundantly, as very soon to become a most troublesome weed.

The roots of the Leopard's-bane were formerly employed in medicine, as alexipharmics and purifiers of the blood; but, on account of their violent operation, have been justly exploded.

LEOPARD's-BANE, the GERMAN, or *Arnica montana*, L. an exotic plant growing wild on the Alps, and on the high mountains of Germany.

This vegetable delights in a moist, shady situation: it may be propagated in autumn, when the stalks begin to decay, either by parting the roots, or by sowing the seeds, soon after they become ripe. It is a very hardy plant, and requires no other care than to be kept clear from weeds.

The German Leopard's-bane possesses an acrid bitter taste; and on bruising it, emits a pungent odour, which excites sneezing. Hence the country people, in some parts of Germany, employ it in snuff, and smoke it as a substitute for tobacco.

Various medicinal properties are attributed to this vegetable: it has been chiefly recommmended in paralytic affections, and in cases of gutta serena. For the removal of such disorders, an infusion is to be made, of from one to four drams of the flowers in a pint of boiling water; and the liquor to be taken in divided doses, in the course of the day. Although the use of this remedy is frequently attended with no sensible operation, yet sometimes it produces vomiting, sweating or a copious discharge of urine;

and, in some paralytic cases, the cure is said to be preceded by a peculiar prickling sensation, and by shooting pains in the affected parts. It has also of late been recommended as a very powerful antispasmodic; and it is said to have been successfully employed in agues, as well as in gangrenous affections; where it is asserted to be equally efficacious as the Peruvian bark, when administered in the form of an electuary with honey. But, as the alledged virtues of the German Leopard's-bane, have not hitherto been confirmed by the experience of British practitioners, the real efficacy of this active plant remains to be ascertained by future observations. If, however, too large a dose of this medicine should have been swallowed by mistake, its most effectual antidote will be *vinegar*, which ought to be taken without delay, in copious draughts.

LEPROSY, or *Lepra*, a cutaneous disorder, in which the skin is rough, with white eschars resembling bran, though they are sometimes moist beneath the surface, and accompanied with an intense itching.

This loathsome distemper, though at present very rare in Britain, is sometimes caused by the gout; melancholy; by touching the torpedo; but more frequently arises from the eating of impure flesh, especially that of swine which had been infected with the *murrain*.

Various remedies have been devised for the cure of the leprosy: among these, mercury, both internally and externally; sea-water; the cold bath; and the purging mineral waters, have been successfully employed. The expressed juice of the common fumitory (in doses from twenty to sixty drops, frequently repeated,) has likewise been prescribed with advantage; and, according to Dr. LETTSOM, a decoction of the inner bark of the elm has removed the complaint, even after antimonials and mercurials had failed. The diet of patients afflicted with this malignant eruption, ought to consist chiefly of milk, carefully avoiding whatever may irritate the system...... Their daily drink should be either whey or butter-milk.

[Many cases of this disease are said to have been cured in New-Jersey, by bathing the parts affected with the following application, *twice* every twenty-four hours, for two months: Bruise the leaves and berries of night-shade, and let the juice stand twenty-four hours in the sun, then mix gun-powder with it very thick, and reduce it to a thin consistence with sweet oil.]

The leprosy is not peculiar to man, but frequently appears among quadrupeds, especially hogs; when it is generally called the MURRAIN; under which article we shall point out a few of its appropriate remedies.

LETHARGY, or *Lethargus*, a species of apoplexy, which is manifested by an invincible drowsiness, or inclination to sleep, from which the patient is with difficulty awakened; and, if, roused, he remains destitute both of sense and memory; so that he soon relapses into his former sleep. It is attended with an increased degree of heat; slow fever; full pulse; paleness; swelling of the eyes; and a coldness of the extremities.

Various circumstances concur to produce this affection: the more remarkable of these are, injuries of the brain, arising either from ex-

ternal or internal causes; congestions of blood in the head; terror, anger, or other depressing passions; to which may be added, sneezing medicines, and strong exhalations of flowers.

Many remedies have been employed to remove this growing drowsiness, with different degrees of success. In plethoric persons, blood-letting, blisters, and emetics, have often procured relief. Considerable benefit has also been derived from the sudden affusion of cold water upon the head; from the use of stimulant clysters; and the burning of feathers, or other fetid substances, held near the nostrils. The patient ought to avoid whatever is difficult of digestion such as heavy salt meats, fish, milk, and cheese. His diet should be light, and taken in small quantities; while he must endeavour to resist and counteract the propensity to sleep, by frequenting chearful company, taking daily and moderate exercise in the open air, or similar exhilirating means.

Lethargy, in *Farriery*, a disorder to which horses are frequently liable. It is easily discovered, when the animal rests his head with his mouth in the manger; is often inclined to eat, but generally falls asleep with the food in his mouth, and frequently swallows hay or corn without chewing it.... In such case, emollient clysters are equally useful and necessary: it will also be advisable to take a little blood, if the horse be young and robust, but in old animals, diligent curry-combing, and moderate walking, or occasional bathing in the sea, or a river, will be more conducive to their cure. Volatile salts, and other pungent odours, are here likewise of service, and should be often applied to the nostrils....The following alterative purge may be administered, and repeated, if there be a prospect of recovery: Take one ounce of socotrine aloes, half an ounce of myrrh, two drams of asafœtida, a similar quantity of gum ammoniac, and one dram of saffron. These ingredients are to be carefully mixed, and formed into a ball, with syrup.

Such remedies are generally attended with success, if the horse be not old, but in the possession of its vigour. Farther, it is a favourable sympton, if he have a tolerable appetite; drink freely, without drivelling; lie down and rise carefully, though seldom. But, if the contrary circumstances occur, and the animal be altogether listless, taking no notice of whatever happens about him; if he dung and stale rarely, while he is sleeping and dozing; these appearances prognosticate a speedy dissolution, which cannot be prevented by art.

LETTER, in its primitive sense, denotes a character of which the alphabet is composed; but it is commonly used to signify a written address to an absent person. The term letter is often, though ironically, confounded with *epistle*, which more properly applies to scripture, or the writings of the ancients; but, according to its modern import, to a poetical, or other formal declaration.

If the nature and dignity of style be considered, a letter admits of every modification of language..... Hence a confidential tone may prevail in friendly and facetious correspondence; a middle style, partaking of the serious and didactic, in letters on business, as well as in

narratives of events, and philosophical disquisitions; lastly, a sublime style, when sacred duties are to be inculcated, or exalted ideas to be excited.

As a letter is intended to supply the place of verbal conversation, it follows, that the language of civilized life, or social intercourse, is the safest guide to epistolary composition. Let us therefore write as we would speak, if the person to whom the letter is to be directed, were actually present. Hence an easy and simple arrangement of ideas will, in general, be the most suitable. But, as a letter is a more permanent declaration of sentiments than a verbal profession, the former consequently requires a greater choice of expression, prudence and reflection, than is generally bestowed on oral conversation; hence, it is not entitled to those concessions or indulgencies which are readily granted to the transitory words of the former. Thus, purity of diction, perspicuity and precision of ideas, together with a lively and unaffected mode of expressing them, are the principal requisites of a good letter.

One of the most necessary rules of letter-writing is conciseness. In addressing our superiors, we ought therefore to make use of no phrases or circumlocutions, which tend to confound rather than to explain the subject. Diffuseness breeds ambiguity, and often represents a number of words without meaning. Hence a *long* letter may not unaptly be compared with a tedious person, who is constantly moving, as it were in a circle, but never arrives at the end of his journey.

A short and satisfactory treatise on the subject of writing letters, appears to us still wanting; though many useful remarks and rules are interspersed in the works of WARD JOHNSON, BLAIR, and other didactic writers.

A new method of copying letters has lately been proposed; which is certainly less expensive, and promises to be nearly as expeditious, as that obtained by means of *Copying Machines:* we have, therefore, been induced to subjoin the following directions.

First, the letter to be copied, must be written with good black ink, in which a little sugar has been dissolved. Damp, unsized paper, or such as has previously been rendered sufficiently porous by suspending it over steam, is then to be adapted to the size of such letter, and be laid on the writing, which ought to be in a dry state. Several clean sheets are now to be arranged on the copying paper; and a flat iron, moderately heated, should be passed uniformly over the whole, till it be thoroughly dried. If the original be written on both sides, it must be placed between a double sheet of such unsized paper, and managed in the manner above directed; when an exact copy will be procured. In this instance, however, the iron must be applied with the greatest expedition, lest the unsized paper become too dry, or communicate its dampness to the ink; in which cases, either no impression would be taken, or the ink would sink: lastly, the iron ought to be pressed on the paper longer than is usual for single sheets; in order that the heat may be regularly diffused, and the full effect be ensured.

LETTUCE, or *Lactuca*, L. a genus of plants comprising 15 species, two of which are natives of Britain: the principal of these

is the *virosa*, Wild or strong-scented Lettuce, that abounds on chalky soils, and dry banks of ditches; flowers in the months of August and September. It has a strong odour, not unlike that of opium, and is possessed of similar narcotic properties, that reside in its milky juice; small doses of which, newly expressed from the plant, are recommended in the dropsy. It is said to agree with the stomach, to allay thirst, and to be mildly laxative.

Several other species and varieties of the Lettuce have, at different times, been introduced into Britain, and are now cultivated for culinary purposes. The principal of these are: 1. the Common or Garden Lettuce, which is propagated from seeds that are generally sown early in the spring, that the plant may be cut and mixed with other salads. In its more cultivated state, this kind is known by the name of Cabbage Lettuce. 2. The Silesian. 3. The Imperial. 4. The Royal Black; and 5. The Upright White Cos-Lettuces, which are the most valuable plants of this nature now reared in our gardens. They are likewise raised from seed, which should be sown towards the end of February, or in the beginning of March, on a warm light soil, and in an open situation. As soon as the plants shoot forth, it will be necessary to *thin* them, so that they may be 15 inches apart in every direction, after which they will only require to be carefully weeded; and, as the Black Cos-Lettuce grows large, it will be necessary to tie its leaves together, in order to whiten the inner part.

There are two other sorts, known under the name of *Dutch brown* and *Green Capuchin* Lettuce, which may be sown late, under walls; being very hardy, they withstand the severity of the winter, and will be valuable when no other green salad can be procured.......BECHSTEIN states a curious fact, which deserves to be recorded, namely, if the two varieties last mentioned be planted together, and suffered to bear seeds, in a rich, warm, but moist soil, the future produce of such seed will be a new and very excellent kind of this plant, forming extraordinary large heads, the leaves of which are sprinkled with deep red spots, and uncommonly tender.

Properties....The various kinds of garden-lettuce are emollient, cooling and wholesome salad-herbs; they are easy of digestion, somewhat aperient, and supposed to possess a soporific quality: there is no doubt, that by abating heat, and relaxing the fibres, they in many instances contribute to procure rest. But, for this purpose, lettuces should not be eaten with oil and vinegar, as the former renders them less digestible; but, if either or both of those condiments must be used, it will be advisable to add sugar, which will counteract the rancid nature of the oil; though simple salt is the most proper spice for salads.

LETTUCE, the *Hair*. See Common Sow-THISTLE.

LEVEL, an instrument, by means of which a line may be drawn parallel to the horizon, in order to determine the height of one place with respect to another; for laying grounds even, conducting water, regulating descents, draining fens, &c.

There are various kinds of levels, adapted to different purposes, of

which we shall notice only such as are of a simple construction, and in general use.

1. The *Carpenters'* and *Paviors' Level* consists of a long ruler, in the centre of which is fixed, at right angles, another somewhat larger, and at the top of which is fastened a line, that shews the base to be horizontal.

2. The *Masons' Level* is composed of three rules, so joined as to form a rectangle somewhat similar to the letter A; from the top of which a plummet is suspended, by means of a thread that passes over a perpendicular line marked in the middle of the base, if the object to which the level is applied be horizontal; but which deviates from such mark, in case one side be lower than the other.

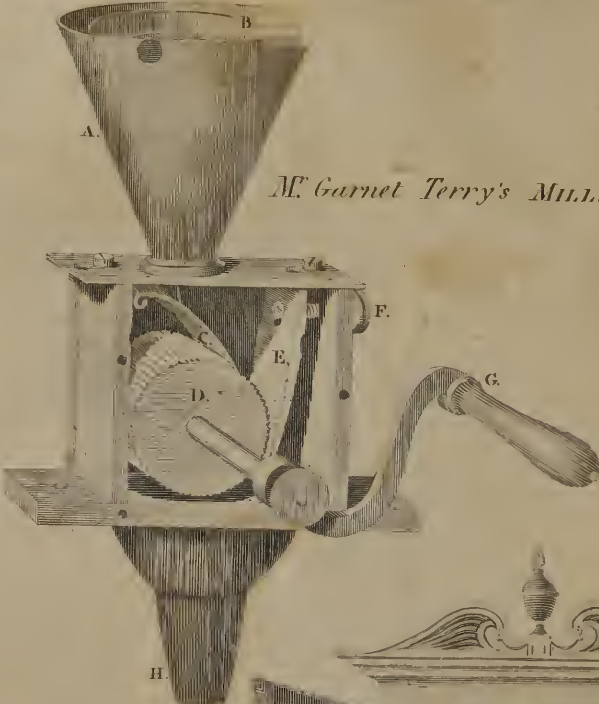
3. The *Water Level*, which shews the horizontal line by means of water or any other fluid, is founded on the principle that water is always level. The most simple instruments of this kind are made of a long wooden trough or canal, the sides of which are parallel to the base; so that, when it is equally filled with water, its surface points out the actual degree of declivity. Or, it may be made with two cups fitted to each end of a pipe, three or four feet long, and about one inch in diameter, so that the water may communicate from one cup to the other: and, as this pipe is moveable on its stand, by means of a ball or socket, when the two cups become equally filled with water, their surfaces shew the line of level. Instead of cups, however, two short glass cylinders, three or four inches in length, may be fixed to both extremes of the pipe, with wax or mastic. Some water, either plain or coloured, is now poured into the pipe, when the liquor appears through the cylinders, and thus the horizontal line is determined. This contrivance is very simple, and of great service for taking the level of small distances.

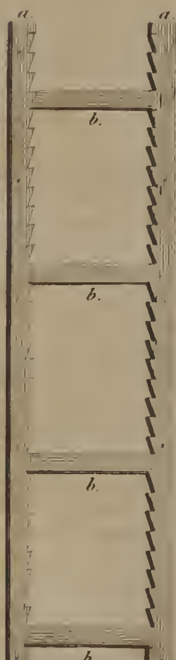
There are various other kinds of water levels, which have been designed with a view to ascertain declivities, for the purpose of irrigating land: as these, however, are either too complicated, or otherwise defective. we refer the reader to the article IRRIGATION, where he will find an account of a more simple contrivance, illustrated with a cut, and which is calculated to remove these difficulties. Lastly, though we have several other instruments for taking levels in particular situations, yet, as their application requires a previous knowledge of mathematics, and is not strictly connected with domestic economy, our limits do not admit of farther descriptions.

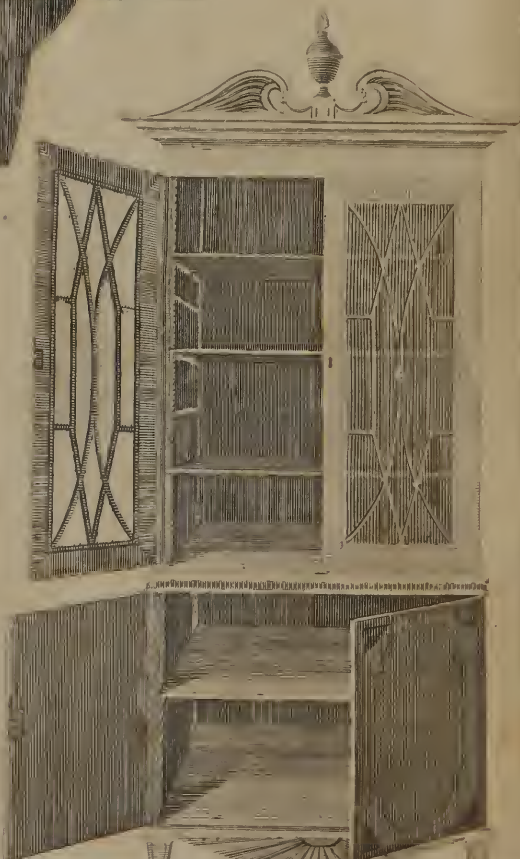
LEVER, a bar made of iron or wood, one part of which is supported by a fulcrum or prop, so that all the others turn upon it as their common centre of motion.

Levers are of various kinds, according to the purposes for which they are designed; and, being eminently serviceable for the lifting of weights, we have subjoined the following representation of a *Cross-bar-lever*, which is particularly calculated for raising earth that abounds with great quantities of stones; though this machine is likewise applicable to other objects. It was invented by Mrs. WYNDHAM, of Petworth, in Sussex, Eng-

Mr. Garnet Terry's Mill.







land, on whom the *Society for the Encouragement of Arts, &c.* in 1796, conferred their silver medal.

A, is the lever.

B, an upright piece of wood, to be affixed to the lever; care being taken to place the side marked with this letter opposite to that marked A on the lever; by which means it inclines backwards, and thus increases the power.

C, is a cross-bar, being the hand by which the workmen exert their strength.

D, is another cross-bar, to be placed at the bottom, behind the upright piece of wood, on which the labourers are to stand, and through which the end of the lever passes. These additions are so constructed, that they may be occasionally fixed and removed; because they are to be employed only, when the strength of the rock, or earth, requires an increase of power.

Should the rock be elevated so considerably above the ground, as to endanger the men by its fall, when the separation takes place, the lever may be reversed; so that the labourers will stand upon the bar intended for the application of their hands, in common cases; and thus all danger will be effectually prevented.

Various other levers have been contrived; but, as they relate to particular branches of mechanics we shall only take notice of Mr. SNART's *sliding lever;* which he quaintly calls an *alexiʃpos*; and which was also laid before the patriotic Society above mentioned.... As various accidents happen to horses that frequently fall, while they are in the shafts; and the present construction of carts, as well as other two-wheeled carriages, is especially unfavourable to the animal in such a situation, by preventing him from being speedily raised; Mr. SNART has contrived a lever for the express purpose of relieving the unfortunate quadruped. He farther states, that it may occasionally be of service in loading carts, where the common length of those vehicles is not in proportion to the articles to be carried.

The contrivance is ingenious, and, notwithstanding its pedantic name, deserves to be more generally known: but, as we are not disposed to enter into particulars, the inquisitive reader will resort to the 18th volume of the *Transactions of the Society for the Encouragement of Arts, &c.* where this invention is fully described, and illustrated with an engraving.

[LIBRARY. In Vol. I. p. 339, mention was made of an excellent mode of constructing book-cases,

so as to permit the ready removal of the shelves. The cut intended, as an illustration of the plan, was however, so badly executed, that it has been deemed necessary to give an engraving of it; referring, as above, for a more particular description.

a a, the upright pieces of wood in which the teeth are cut.

b b b b, cross-bars for the shelves to rest on.]

LIENTERY, or *Lienteria*, is a species of diarrhœa, in which the food passes through the intestines, almost without having undergone any change: it is not attended with pain, but the patient is frequently affected with an intolerable hunger.

This disorder is occasioned by the relaxed state of the stomach, and is sometimes the consequence of dysentery, though it generally occurs during the earlier periods of life.

Considerable benefit may be derived by administering rhubarb, combined with magnesia; but, if the patient be an adult, it will be necessary to resort to stomachics and tonics, especially the Peruvian bark.

The lientery is seldom a very dangerous disease, unless the patient be of an advanced age; or the constitution be broken by excess, or acute diseases: in either cases, the diet and treatment must be the same as in the DYSENTERY, to which we refer.

LIFE, in a peculiar sense, denotes the animated state of living creatures, or that space of time during which the soul is united to the body.

Longevity has always been highly estimated by man; hence the art of preserving life has become an important study, and ought to form part of the education of every individual. There is, however, a period at which mankind cease to grow; and beyond which our existence continues for a limited time. Thus, if a person attain his full growth at the age of fifteen, he generally dies at that of sixty; provided that no accidents intervene, by which the vital principle be affected, and prematurely extinguished. According to the calculations of others, every animal body is by Nature destined to live *eight* times the length of its growth.

From the most accurate political accounts, made by comparing the bills of mortality published in different countries and climates, we shall insert the following result: Of one thousand persons living in large cities, no less than thirty-five or thirty-six die annually; while, in country places, or small towns, only from twenty-eight to thirty deaths happen in a similar period. Among 1000 children, five die during parturition; and scarcely half that number in child-bed; but about 300 are computed to fall victims to a perverse mode of education, though suckled by their mothers; and not less than 500, or one half of all that are born, if reared by wet nurses. The mortality of infants, indeed, has increased to a most alarming degree in this luxurious age; as the plurality of them is carried off by convulsions, and difficult teething. Among 115 dead persons, there is only one woman deceased in child-bed; and, of 400 mothers, only one by previous pains. A greater proportion of boys than of girls die of the natural small-pox. There are always to be found more aged persons in hilly or mountainous coun-

tries, than in low situations; and it is proved by the most authentic computation, that of 3,125, only one individual survives the hundredth year. From the same source, the following is the most probable chance which persons may have for the duration of their lives, after a certain fixed period; namely,

	Years.	*Months.*
A new-born infant will probably live .	34	6
A person of 1 year old	41	9
3	45	7
5	46	4
10	44	9
15	41	6
20	38	3
25	35	3
30	32	3
35	29	8
40	26	6
45	23	0
50	20	11
55	17	0
60	14	2
65	11	5
70	8	11
75	6	3
80	4	10
85	3	3
90	2	0

The proportion of the female sex to that of males, with respect to the number of deceased, is as 100 to 108. Previously to the 60th year, the chance of survivorship is in favour of women; but, after that age, men generally survive them. Married women, on the whole, live longer than those in a state of celibacy. From observations made for the space of fifty years, it is evident that most persons die in the months of March, August, and September; but the fewest in November, December, and February. In populous cities, however, such as London and Paris, death makes the greatest havock during the *winter*.

One half of the human race is doomed to dissolution, before they have completed the 17th year of their age; but, after this critical period, the survivors' chance of life becomes more valuable with every year: hence, for instance, a person thirty years old, according to the preceding calculation, will probably live thirty-two years longer; so that he may attain the age of sixty-two; whereas a youth of fifteen, though he have a chance of living forty-one and a half years longer, will nevertheless arrive only at the 56th or 57th year of his age.

Conformably to the observations of Boerhaave, the most healthy children are born in the months of

January, February, and March: indeed, the greatest number of births takes place during the two months last mentioned. The proportion of boys, annually born, is to that of girls, as 104 to 100; but, on the other hand, a greater number of the former die during infancy than of the latter; so that, about the age of puberty, both sexes are nearly equal. Among 65 or 70 infants, there is generally but one instance of *twins*. The number of marriages, compared to that of the whole population of a country, is as 175 to 1000. Four children are generally computed to arise from each married couple; but, in towns, only thirty-five children from ten families. Lastly, it is proved from the records of the most experienced physicians, that, among 100 persons living in cities, throughout the year, only twenty are indisposed, or confined to their beds for one month; or twenty-four for the space of a fortnight.

With a view to prolong human life, Lord Bacon recommends the bath, after which unctions of salves and oils are to be applied, in order to exclude the influence of the external air.

[Lord Monboddo, of Scotland, who lately died 90 years old, and upwards, was in the practice of anointing his whole body with oil, and believed it greatly contributed to his health.]

We have already pointed out the most proper treatment of persons in a feeble state, under the article Debility; and, at the same time, stated the necessary rules and directions for the preservation of health, and consequently the prolongation of life. There is, however, so much justice in the observations of the late illustrious Haller, on this subject, that we are induced to insert the following brief statement. He remarks, that some of the causes which contribute to protract life, beyond its usual period, are *external*. Such, for instance, is climate: hence, the more northern latitudes, or about 50 degrees, are the most proper for youth; because, in such a region, the circulation is less rapid, and acute diseases seldom occur. But in a more advanced age, when the pulsations of the heart are faint or slow, and its irritability is diminished, a warmer region is more salutary; and he recommends aged persons to migrate 30 or 40 degrees, or even nearer to the equator, where they may enjoy, at pleasure, the genial warmth of the sun, or the cooling shade.

Among the *internal* causes of longevity, the rudiments of a sound body, descended from parents uncontaminated by hereditary disease, are to be considered as the principal: thus dropsy, gout, apoplexy, consumption, and the long train of disorders that are too frequently transmitted from one generation to another, will in a great measure be prevented. With respect to the mode of living, Haller recommends abstemiousness during youth; the drink should be water, which Nature has provided for our common use; and he justly considers wine as a species of medicine. Animal food should be sparingly eaten, together with a large proportion of vegetables, and but a small addition of saline or aromatic substances. Temperance is, in every respect, an essential point; so that the quantity eaten may be well digested, and perfectly assimilated; that the

blood may circulate regularly, and free from all corruption or infection, similar to that of an infant. Aged persons, however, may somewhat more freely indulge in the use of animal food: on the other hand, tranquility, both of body and mind, is of the greatest consequence; as nothing is more detrimental, than an irritable or irascible disposition. Hence, a due mixture of a lively and placid temperament, is a very desirable condition, so as to be neither insensible of pleasure, nor too much addicted to the gratification of sensual desires. Moderation is, therefore, here likewise a beneficial attribute; but, with regard to sleep, old and decrepit people may be more indulgent. Those readers, who are anxious to become acquainted with more minute rules and directions for prolonging human life, both in a state of health and disease, will derive considerable information from Professor HUFELAND's "*Art of prolonging Life*" (8vo. 2 vols. 10*s*. Bell, 1797), and from Dr. STRUVE's *Asthenology; or, The Art of preserving feeble Life*" (8vo. 8*s*. Murray and Highley, 1801), in which the subject is amply and philosophically discussed.

LIGHT signifies that invisible fluid which renders objects perceptible to the sight. The velocity of light is almost inconceivable, though its motion is not instantaneous: the particles of light fly nearly 200,000 miles every second of time, which is above a million of times swifter than the passage of a cannon-ball. And, as half the diameter of the Earth's orbit, extends to 90,000,000 of miles, the rays of the sun travel that vast distance in $8\frac{1}{4}$ minutes, before they illuminate our earth.

The nature of light has, at all times, been a subject of speculation among philosopers; and various theories have been formed and rejected, or succeeded by others that were more plausible, though inconclusive. Sir ISAAC NEWTON conjectured it to consist of rays, some of which possessed a greater degree of refrangibility than others: subsequent philosophers are not yet agreed, whether light and heat are the same fluid under different modifications, or two distinct fluids which are frequently united. Amid this concussion of opinions, it is difficult to select the most probable; we shall therefore briefly state the effects of this agent upon the vegetable and animal creation.

Light is essentially necessary to vegetation: in our climate, it is seldom productive of injury by its excess, though the want of it is often pernicious. This fluid acts as a kind of stimulus on the more irritable parts of plants; as appears from the sun-flower and others, that expand or bow when exposed to the rays of the sun: hence Dr. DARWIN supposes there may be diseases in plants, arising from the excess of this stimulus, but which, he thinks, have hitherto been disregarded. To corroborate this conjecture, he specifies the Goat's-beard, or Salsafie (*tragopogon*, L.) and some other vegetable productions, which closes their flowers about noon, in order to prevent the influence of such stimulus.

On the contrary, the absence or defect of light produces a disease called *etiolation*, or *blanching*, be-

cause vegetables deprived of that fluid become white. It has a similar effect on animal bodies; which, as Dr. DARWIN has pointedly remarked, are in consequence rendered pale and inert: this is confirmed by the languid and *etiolated* countenances of the young ladies in some boarding-schools, where, from false motives of delicacy, they are secluded both from the light of the sun, and the invigorating influence of the air: it is still farther evinced in those studious persons, who pass their waking hours in unventilated apartments, especially during a considerable part of the night.

But, though such *etiolation* be naturally injurious to vegetation, it has been artificially employed with success, in rendering certain plants esculent, by depriving them of their acrimony, cohesion, and colour. This method is chiefly practised on celery, by earthing up that plant nearly to the top; on sea-kale, by covering it entirely with horse-litter or straw; and lastly, on lettuces and endive, by tying the root-leaves together with a bandage. On the chemical effects of light, we are silent; for the opinions respecting them are not less unsettled than those concerning its nature. The inquisitive reader will find ample information on this subject, in the writings of Dr. PRIESTLEY, and also in the different volumes of the *Transactions of the Royal Society*.

LIGHTNING, a vivid bright flash of fire, which suddenly appears in the atmosphere, and instantly vanishes: it is sometimes attended with heavy clouds and thunder: but often occurs while the sky is serene, especially in sultry summer evenings.

The phenomena accompanying this meteor are always surprising; but, in many cases, truly terrific: various causes have been assigned by philosophers with a view to explain them. It is, however, now generally understood to be an electrical phenomenon.

In common with electricity, lightning possesses the property of burning and dissolving metals; it rends bodies, often deprives persons of sight, and sometimes extinguishes the vital principle; divests magnets of their virtues, and reverses their poles. Indeed, there is no appearance in nature, that presents a greater diversity to the contemplative mind; for each flash is widely different from another; nor are its effects alike fatal.

When the igneous meteor exhibits a deep red colour, it is seldom accompanied with dangerous consequences; but, if the flashes be bright, pale, and in a zig-zag direction, destruction generally marks their course. The most mischievous form, however, which lightning assumes, is that of fiery balls: wherever such masses descend, they burst, and occasion extensive damage.

As lightning uniformly strikes the most elevated objects, such as lofty trees, steeples, and particularly the masts of ships and chimnies of houses, various expedients have been contrived, in order to divert, or at least break its force. These efforts of human ingenuity were first published, or recommended to public notice, by Dr. FRANKLIN; and, from their acknowledged utility, CONDUCTORS are now generally adopted: We have already pointed out the most judicious form of constructing them in our 2d volume.

Another method of preventing the fatal effects of lightning, consists in the artificial attraction of electrical matter from the clouds, be means of a KITE.

Persons struck with lightning may, in many instances, be restored by proper and timely applications. In slighter cases, where particular limbs are affected, the wounded part has been cured by washing it with a solution of sugar of lead. According to TODE, considerable relief has been derived from applying opium to the painful part of the breast, after being hurt with lightning; and a person wounded by this meteor, was perfectly cured in the course of ten days, by the application of ley to the part affected, and by the internal use of carbonate of pot-ash, or fixed vegetable alkali dissolved in water. Should, however, any person be apparently killed by such an accident, he ought by no means to be neglected, or precipitately committed to the grave; for we are persuaded that many *might be* restored, if proper resuscitative means were employed.

In general, there are no external marks discoverable, when the body has been injured by a flash of lightning; though sometimes red streaks appear on different parts, especially on the chest and arms, in which the patient, after recovery, experiences a sense of burning heat. The first step should be, to remove the body from the farther influence of mephitic air of the place, where the unfortunate blow was inflicted. Clothes and bandages of every kind must be removed; the body placed in a reclining posture; and the head raised, somewhat leaning to the right side: thus the subject is to be covered with warm blankets or clothes; while both the doors and windows are opened for admitting fresh air.

Resuscitatives: Sprinkle the face with cold water; put the whole body up to the neck, if convenient, in the earth-bath, where it should be kept for several hours, till certain signs of returning life appear: or expose the subject, if robust, to the influence of the shower-bath; apply cold poultices to the head; cloths dipped in vinegar to the pit of the stomach; and gentle friction, which should be resorted to, alternately, with the sprinkling of cold water, from the beginning of the process; at first with great caution, over the lower extremities, and gradually extending it upwards to the left side of the body.

In particular cases, where the means before stated prove ineffectual, it will be advisable to open a vein, or to electrify the patient, by directing the shocks through the breast, so that this fluid may pervade the heart. Meanwhile, pure air may be blown into the lungs (see article DROWNING,); and if anxiety appear to prevail, blisters should be applied to the chest.

When *signs of returning life* become evident, the mode of treatment before pointed out, must be continued for some time, though with great moderation. The cloths applied to the pit of the stomach, should now be dipped in wine, or *warm* vinegar; common poultices applied to the injured parts; and emollient clysters may be occasionally given. Lastly, when the patient is able to swallow, a mixture of wine and water, or balm-tea, may be safely administered.

Dr. FRANKLIN suggests to those persons, who are apprehensive of

danger from lightning, the propriety of sitting in the middle of a room on one chair, and to lay their feet on another; provided they be not placed beneath a metal lustre suspended from the ceiling by a chain. He farther observes, that it is still safer to fold two or three mattrasses or beds in the middle of an apartment, and to place the chairs upon them; for, as the former do not conduct lightning so readily as the wall, the flashes cannot penetrate their substance. But the most secure place, in his opinion, is a hammock, suspended by silken cords, in the centre of a room. The curious reader, who wishes to obtain farther information respecting electrical meteors, will be amply gratified, by perusing Dr. FRANKLIN'S *Experiments and Observations on Electricity*, (4to. 1769, 10*s*. 6*d*.); and Dr. PRIESTLEY'S *History of Electricity*, 4to. in which this interesting subject is perspicuously treated.

The effects of lightning are frequently not less fatal to vegetable productions. Wheat-plants are peculiarly susceptible of this injury; and Mr. TULL is of opinion, that not only their health is thus greatly impaired, but also their immediate decay, is thereby often occasioned. Such consequences, he observed, were evident from the black spots or patches in a field of corn, especially in those summers which were visited by frequent thunder storms: and he adds, that there is no remedy against this evil.

Forest-trees, in particular, experience similar blasts; and, on sawing them, numerous instances have occurred, in which they were found cracked, split, or otherwise mutilated by lightning. Dr. DARWIN conjectures that vegetables are affected by this meteor in a manner similar to that, when their succulent shoots are frozen; that is, their vessels burst, as the lightning passes through them, in consequence of its expansive power.

LIGNUM VITÆ. See Guaiacum.

LILAC, or *Syringa*, L. a genus of exotic plants, natives of Persia, consisting of three species, the principal of which is the *vulgaris*, or Common Lilac. It has long been cultivated in our gardens, on account of its ornamental flowers; and, if properly managed, will grow to the height of 18 or 20 feet

This shrub thrives on almost any soil, but it produces the most beautiful flowers on rich, light land, though it flourishes best on wet grounds. It is propagated by suckers, which should be separated from the parent plants in the month of October, and set in a nursery, in rows three feet asunder, each sucker being one foot distant from the other. In the second or third year, they may be removed to the spot where they are intended to remain. After this operation, no farther attention will be required, except digging about their roots once in the course of the year, and cutting off the suckers; which not only destroy the beauty of the plant, but likewise deprive it of its nourishment.

The leaves of the Common Lilac are frequented by the Spanish Fly: ....the yellowish and red streaked wood of old trees is valuable to turners and cabinet-makers; as the vessels or utensils manufactured of it, are equal to those made of olive-wood, and almost indestructible; by immersing such articles in a cold dye, consisting of aqua-fortis largely diluted with wa-

ter, they acquire a fine red colour. From the flowers of this plant may be distilled an essential oil, similar to that of roses.

LILY, or *Lilium*, L. a genus of exotic plants, consisting of ten species, all of which are remarkable for the beauty of their flowers; but the two following deserve a distinguished place:

1. The *candidum*, or WHITE LILY, which produces a beautiful flower, the fragrant odour of which is so powerful as to induce fainting, if numbers of it be kept over night in a close apartment: an essential oil may be obtained from them, in a manner similar to that described under the article JASMINE.

2. The *bulbiferum*, or FIRE LILY, which also bears fine flowers of a flaming red colour, and which, by culture, sometimes become double. The Russians and Tungusians eat the roots of this species, either roasted, or boiled in milk; and Dr. FRANKE informs us (in his *System of Medical Police*, printed a few years since, in German), that these mealy roots might in times of scarcity, be prepared into wholesome bread. On account of their emollient and maturating properties, they have been greatly recommended in the dropsy; but are chiefly employed in cataplasms, when boiled, and bruised into a pulp, with oil: in this manner, they are said to form an efficacious application to recent burns.

[In the United States, we have the following native species of lily. *L. Superbum*. This grows in BARTRAM'S garden, and well deserves its name, as it is a truly elegant plant. The stem rises 13 feet in height, and is crowned with a panicle of between 40 and 50 flowers of a red colour, yellow within, and spotted like a Leopard's skin with dark crimson, almost black. 2. *L. Philadelphicum*. 3. *L. Canadense*. 4. *L. Carolinianum*, all elegant flowering plants. In Kamskatska, the inhabitants eat the root of the lily, boiled or roasted.]

LILY-OF-THE-VALLEY, or MAY-LILY, *Convallaria Majalis*, L. an indigenous perennial plant, growing in woods, heaths, and at the foot of hills: it flourishes in the month of May.

This vegetable is eaten by sheep and goats, but refused by cows, horses, and hogs; its flowers are in a high degree fragrant; but, when dried, they acquire a narcotic scent, and, if reduced to powder, excite sneezing. Both the flowers and roots have a bitter taste; and an extract, made from either, possesses similar purgative properties with aloes;....the dose being from 20 to 30 grains. A beautiful green colour may be prepared from the leaves, with the addition of lime.

LILY, the WATER, or *Nymphæa*, L. a genus of plants comprising nine species, two of which are natives of Britain, namely,

1. The *lutea*, Yellow Water-lily, or Watercan; which grows in gentle rivers, pools, and ditches; blows in the months of July and August. When the small yellow flowers begin to fade, the seed returns to the water, in which element it attains to maturity, and again germinates. This aquatic vegetable is eaten by hogs; but goats do not relish its flavour, and it is totally refused by horses, cows, and sheep. The flowers possess an odour similar to that of *brandy;* and the roots, if moisten-

ed with milk, are said by LINNÆUS to destroy crickets and cockroaches.

2. The *alba*, White Water-lily, Candock, or Water-socks, which grows in ponds and slow rivers; flowers in the month of July. This species is one of the most beautiful British plants, and may be propagated by transplanting its bulbous roots in the winter. It is eaten by hogs, but disliked by goats, and totally rejected by cows and horses. The roots are employed in Ireland, and the Island of Jura, for dyeing a dark brown colour; but the Egyptians eat them boiled, and convert the seeds into bread. The Swedes also, in prevailing dearth, have used the root of this plant as a substitute for corn; though it requires to be previously divested of its bitter taste, by frequent ablutions.

According to CLEDITSCH, the roots of the white and yellow lily are equally useful in tanning and currying.

[Several species of *Nymphæa*, or Water-lily, are natives of the United States; as *N. alba*, *N. lutæa*, *N. odorata*, *N. advæna*, *N. sagittifolia*, *N. reniformis*, *N. Lotus*, *N. Nelumbo*. The two last are particularly worthy of notice.

1. *N. Lotus* is also a native of Egypt; where the roots boiled in water, have been eaten from the earliest antiquity. It is distinguished from all the other species, by having dentated leaves.

2. *N. Nelumbo*. This plant is known by the name of *Nelumbium Speciosum*. It abounds in BROGDEN'S creek, between Philadelphia and Gloucester-point, and Mr. WM. BARTRAM informs the Editor, that it is found in lakes, ponds, and stagnant bays of large rivers, on the Atlantic coast from New-Jersey to East and West Florida; and Westward, as far as Lake-Erie.... The leaves are orbicular and peltated, and very large, particularly those lying on the surface of the water, many of them being eighteen inches, and two feet over.... The flowers appear in Pennsylvania in August, and when expanded, are four or five inches in diameter, and of a lemon colour, and make a fine appearance. The flower is succeeded by a turbinated pericarp, containing many oval pointed seed of the size of an acorn; their points perforate the horizontal surface of the seed vessel, and when fully ripe, are black, and hard. The kernels resemble in taste, that of the chinquapin (*fagus pumila*). Sir GEORGE STAUNTON informs us, that in China, the roots of this plant are highly esteemed, and are sliced and served up at table with ice in summer.... In winter, they are preserved in salt and vinegar. A conserve is also said to be made of the nuts when not quite ripe, and given as a restorative after sickness. This plant ought to be cultivated in every creek having a muddy bottom. The seeds must be placed in the spot they are intended to occupy, immediately on being taken from the seed vessel.]

LIME, a white, soft, friable substance, prepared of marble, chalk, or other calcareous earth, by burning them in a kiln.

[The common form in which lime-stone is found, is that of combination with the acid of charcoal, or fixed air. The lime is obtained, in a caustic state, by exposure to a high degree of heat, whereby the carbonic acid is driven off in the state of gas, or air. It is then

called quick-lime, and in that condition, is employed in husbandry and the arts. After having been deprived of its fixed air, the lime is constantly, though slowly, regaining it from the atmosphere, and all other bodies with which the lime comes in contact, and capable of furnishing it; but quick-lime must be previously moistened to enable it to unite with the air. According to Mr. KIRWAN, 100 parts of quick-lime, absorb about 28 of water; and to regain its full proportion of air from the atmosphere, it requires a year or more, if not purposely spread out.

Pure lime-stone, says Dr. ANDERSON, when fully calcined and slaked, is reduced to a fine impalpable powder of a bright white, that feels soft between the fingers, without the smallest tendency to grittiness. When it has any colour, it proceeds from the sand, or other foreign matters in the composition.

If the lime-stone loses much of its weight in calcination, and the lime-shells are extremely light; if the shell require a very large proportion of water to slake them fully: if it is long before they begin t6 fall; if the lime-stone is not apt to *run*, (or be vitrified) in the operation of burning; if it fall entirely when it gets a sufficient quantity of water, after it has been properly calcined: if it swell very much in slaking, and if the lime is light, fine to the touch, and of a pure white, we may be satisfied that it is extremely good, and may use it in preference to any other lime that is inferior to it in any of these respects.]

The chief uses of lime are,

1. As an ingredient in mortar to *cement* brick or stone buildings; for which purpose, being divested of its humidity, and its pores being at the same time opened by the action of the fire, it is so eminently calculated, that it may be easily reduced to powder, and mixed with sand or other matters.....See MORTAR.

2. As a *manure*, it is of the most extensive utility: we shall, therefore, concisely state the properties of the best lime-stone, as well as the proportionate quantities in which it is to be spread on lands; and at the same time point out those soils that are really ameliorated, and likewise such as receive no benefit from its application.

Formerly an opinion generally prevailed, that the most efficacious lime for manuring lands, was produced from the hardest calcareous stones, which most intimately approached the nature of marble: modern experience, however, has amply refuted this supposition..... It appears, indeed, that there are two sorts; namely, *magnesian* and *calcareous* limestone; the latter of which is attended with the most beneficial consequences, while the former is highly injurious to *land*. This remarkable fact was first published by S. TENNANT, Esq. in the "*Philosophical Transactions of the Royal Society*," for 1799; who, being informed of the opposite nature of the two species, made various experiments, in which their respective properties were clearly ascertained.

The barren, or magnesian lime, is found in various parts of England, but especially in the county of Nottingham, where a quarry of it is worked to the extent of thirty or forty miles; also in the counties of Derby and Northumberland, in the latter of which it is

known by the characteristic name of *hot*, in contradistinction to the *mild*, or calcareous lime, that abounds in all parts of Britain. We regret that we cannot enter into a detail respecting Mr. TENNANT's important discovery; the particulars of which are recorded in the volume above mentioned. The magnesian lime may be further distinguished from that made of pure calcareous stone, by its slow and difficult solution in acids.

The hardness or softness of limestone, however, is of no importance, provided it be pure, that is, free from sand, clay, or other substances, which render the mass less fertilizing. With respect to the length of time the materials should be exposed to the fire, it has been found by experiment, that lime burnt in *four* hours, has a much greater disposition to recover its fixed air from the atmosphere, than that which has been burning for the space of *twenty-four* hours; and, as the excellence of this manure is supposed to depend on its re-attraction of fixed air, the process of calcination ought to be regulated accordingly.

In this state, it is called *quick-lime*, and should be spread as speedily as possible, immediately before the plough; so that the greater part may be slacked in the soil. The proportion used, depends much on the custom of the country; but should more properly be adapted to the nature of the land. In the county of York, *thirty-six* bushels only are carted on an acre; in Wales, a quantity somewhat larger: in Ireland, from *five* to *six hundred* bushels are spread on every English statute acre; and in various parts of England, very small portions are injudiciously scattered: for it is the opinion of the most experienced agriculturists, that *three* or *four hundred* bushels at the least, (if the price be not too high) should be allowed to each acre; especially when the soil has long been in an uncultivated state. One *good liming* is, in such cases, decidedly preferable to small quantities frequently repeated.

In common situations, however, where the land does not abound in putrescible matters, and is not vitiated by acids, Mr. YOUNG is of opinion, that 160 bushels per acre, will produce a considerable effect; but, on stiff strong clays, he thinks at least double, or triple, that quantity ought to be allowed.

If lime be applied without any other manure, it is said to exhaust the most fertile particles of the soil. Some agriculturists, therefore, suggest the propriety of forming small heaps, and covering them with earth: as soon as the soil has, by its moisture, slacked the lime, the heaps are to be opened, and as much dung buried in each as the earth will cover. A more economical and judicious method, is that stated by Mr. ANDREWS, in the 4th vol. of *Annals of Agriculture*. He directs about 140 loads (each containing 40 bushels), of moist dung to be heaped up in the month of December, when 200 bushels of lime are to be well incorporated. The whole is then suffered to lie for three months, after which the heap is to be well stirred: when the harvest is completed, the compost is to be spread on a pea-stubble, and ploughed in for barley: but, if the season should not favour the purpose, he directs these labours to be performed after the first frost that occurs. Mr. AN-

DREWS farther observes that, in consequence of such management, his barley-crops have, upon an average of twelve years, amounted annually to four quarters and six bushels per acre.

The advantages arising from this treatment, are, 1. The total destruction of the seeds of weeds, so that the land on which this mixture had been spread, was uniformly the clearest: and, 2. The increased fermentation of the dung, by which its fertilizing properties are more speedily excited. Lastly, the expense of the lime was to him 10*s.* per acre; and its beneficial effects continued for four years.

The soils peculiarly susceptible of improvement, by means of lime, are:

1. Rich black or brown friable crumbling loams, which abound with vegetable matter; its general putrescency being accelerated by the lime, such land is so greatly meliorated as to yield crops, which they could never have produced by the application of any other manure.

2. On low, rich, drained meadows, that have formerly been bogs, and the black soil of which abounds with vegetable fibres.

3. On old sheep-walks, heaths, and commons, which have been under grass for time immemorial, and are first to be converted into arable land; but lime will not be of any advantage, after they have been cultivated for several years. And, though such manure will produce favourable effects upon old *lay* soils, abounding in vegetable particles, yet when the latter are putrified by *liming*, and exhausted by repeated *cropping*, it will be of no service.

4. On moory, boggy, mountainous land; and, according to Dr. HUNTER, on black peat-earth. In his opinion, lime prevents the spontaneous growth of heath, and produces a new family of vegetables, especially white clover. He farther remarks, that the greatest improvements ever made on moors, in any country, have probably been effected by means of lime. There prevails, however, a diversity of opinion on this subject, which we are unable to reconcile. In the 16th vol. of the *Transactions of the Society for the Encouragement of Arts*, &c. THOMAS DAVIS, Esq. (steward to the Marquis of BATH), states that, though lime is the only proper manure for such soil, which is thus qualified to produce crops of corn for the first three or four years, after converting it into arable or meadow land; yet this manure loses its ameliorating properties in the course of ten years; [during which time the vegetable roots, according to DUNDONALD'S *Theory*, might be supposed to have been dissolved]: and he never found a second liming to be productive of any beneficial effect.

5. On all other waste soils that have been over-run for ages with furze, heath, broom, fern, bushes, or wood; and which, though richly stored with vegetable food, have contracted an acidity, in consequence of their long rest, and the spontaneous growth of roots.

On the contrary, lime is of little service on poor, light, and thin soils; or such as are on a quarry of lime or other stone, especially after they have borne crops for a considerable number of years. Nor is it productive of any advantage on strong, stony land; on wet, cold loams, which have not been sufficiently drained; or similar clays

that are tenacious of moisture; but Mr. ARTHUR YOUNG is of opinion, that large quantities of *well-drained* lime, laid on very stiff clay, would be attended with a favourable effect; though he candidly adds, that it never has been tried to his satisfaction.

Quick-lime is also of great utility in rending rocks and stones, when mixed with gun-powder in the proportion of one pound of the former, well dried and pulverized, to two pounds of the latter. This singular property of lime was discovered, and is related, by H. D. GRIFFITH, Esq. in the 8th vol. of the *Transactions of the Bath and West of England Society;* where he states, that the mixture above specified, caused an explosion with a force equal to *three pounds* of gun-powder: hence, in those operations, one-third of the expense may be saved.

[It has been said in a late French publication, that the mixture of salt with lime for white-washing, is an Egyptian practice; and that experiments were made at the *Prytaneum* in Paris, to prove the advantages derived from it. The philosophers who accompanied BONAPARTE to Egypt, were more observant than those who visited the United States during the American war; otherwise, the knowledge of the effect of mixing salt with lime-wash, in rendering walls on which it is put, smooth and glossy, which is familiar to every notable housewife in the United States, would not have been concealed, until last year, from the European world.]

Lime-water was formerly in great repute as a solvent of the stone, and a remedy in scrophulous affections. It has likewise been used both externally and internally for cutaneous eruptions; though we by no means approve of its indiscriminate use, which may be attended with dangerous effects. On account of its astringent properties, this preparation has also been successfully prescribed in cases of *diabetes*, or immoderate flow of urine; and other disorders proceeding from laxity or weakness of the solids. At present, it is chiefly used for washing foul or ill-conditioned ulcers.

[Lime-water is an excellent remedy for a broken winded horse.]

Notwithstanding these useful qualities of *lime*, it is, if accidentally swallowed, or inhaled in any quantity, one of the most fatal *poisons*. Hence, persons employed in lime-works become subject to blood-spitting, asthma, painful constipations of the bowels, and consumption: their countenance turns unnaturally pale; and, after languishing for years, these unhappy victims die in a sleepless state. *Bread*, adulterated with lime, absorbs all those juices of the stomach which ought to promote digestion; obstructs the alimentary canal; occasions almost constant thirst; and at length produces the most violent colics, fevers, and death. As soon, therefore, as it may be discovered that a person has taken into the stomach either *lime* or *gypsum*, the first step will be to administer an emetic, consisting of $1\frac{1}{2}$ or two ounces of vinegar of squills, and 20 or 30 grains of ipecacuanha in powder: large drafts of sour whey should next be given, to facilitate the operation of the medicine. In order to counteract the causticity of lime in the stomach and intestines, it will be advisable to drink,

alternately, a mixture of vinegar and water, lemonade, or similar acidulated beverage, for one day; and, on the other, to make use of mucilaginous decoctions, such as barley or rice-water, gruel, fat broths, oils, or sweet whey in which a small quantity of white soap has been dissolved; to eat salads with a large proportion of oil and vinegar, and ripe and sub-acid fruit. To complete the cure, it will perhaps be requisite to administer, according to circumstances, emollient or laxative clysters.

[The calcination of lime-stone by fire, is only a cheap way of reducing it to powder; but where lime-stone is found, and fuel is expensive, the lime-stone may be powdered and spread to an excellent purpose, according to the experience of Du Hamel....For this purpose mills may be constructed on the principles of an ordinary mill for breaking plaster of Paris; but burning ought always to be preferred, where convenient, because it is impossible, by mechanical means, ever to reduce it to such a fine powder, as it naturally falls into after calcination.

The theory of the action of lime upon soils, is by no means settled; and until the precise circumstances under which it may be advantageously applied to as a manure be ascertained, farmers will be at much unnecessary expense and labour, without a certainty of profit. The chief theories of the principle upon which this substance acts, shall now be detailed.

1. According to Dr. Anderson, lime acts, in manuring land, as a mild calcareous earth. Hence he says, the first year after it is applied to the soil, its effects are inconsiderable, in comparison of what it produces in the second and succeeding years, when it has reabsorbed its carbonic acid, which had been expelled in calcination; and hence he deems one large liming more advantageous than smaller quantities more frequently repeated. Hence too, the utility of powdered lime-stone as a manure.

The mode of applying lime, agreeably to this theory, is pointed out under the artile Land.

2. The following is lord Dundonald's theory of the action of lime.

"When applied to organic bodies, containing moistures, lime rapidly destroys their cohesion, or continuity of parts, and disengages from them inflammable air, and azotic or phlogisticated air, forming volatile alkali. The residuum will consist of charcoal, and of a combination of lime with the phosphoric and other acids, forming saline matters, which are nearly insoluble....Lime is known to have a tendency to sink below the upper surface, and to form itself into a regular stratum between the fertile and the unfertile mould; this tendency, (which by the way, cannot be accounted for simply on the principle of gravity) is of great utility, as the staple or depth of the soil is always increased and rendered less retentive of water in proportion to the distance which the lime descends, and thus affords a greater scope for the expansion of the roots, and nourishment of vegetables.

"An application of a moderate quantity of lime, from time to time, is much to be preferred to the prevailing practice of laying it at once, and in great abundance, upon ground. Abundant dressings

occasion a too immediate dissipation, in a gaseous state, of the vegetable matters contained in the soil, from which the succeeding crop can only be benefited by the proportion it is able to receive during the dissipating process; abundant dressings, moreover, cause an action on the soil more powerful and violent, than is conducive to, or compatible with a continued state of fertility.

"Lime should be considered, 1st, in a chemical; 2d, in a medicinal point of view, when so applied, acting as an alterative, corrector, and decompounder; a disengager of certain parts of the animal and vegetable substances contained in soils, and as a retainer and a combiner with others; and it is not to be regarded by the practical farmer as a substance fit for the immediate food and nourishment of vegetables, like dung, or decayed vegetable or animal matters. For, although calcareous matter, or lime, forms a component part of vegetable and animal bodies, still the quantity that can be obtained from the annual produce of most crops, from an acre of ground, will not exceed eighty pounds weight.

"The effects produced on organic bodies by lime, clearly point out, that *lime should never be mixed with dung*, or with any substances which of themselves or by the application of saline matters, would easily become putrid and rotten. Lime not only puts a stop to the putrefactive process, but disengages and throws off, in a gazeous state, a certain portion of the component parts of such substances; whilst, with those which remain, it forms insoluble compounds that are incapable of promoting vegetation, until they are again decomposed and brought into action by other substances. In making composts, rich surface mould is, of all substances, the most proper, when mixed in moderate quantities, to promote the dissolution and complete putrefaction of the dung..... [See article COMPOST.] This process would be greatly accelerated by the further addition of a due proportion of the vitriolic neutral salts."* See *Treatise on the Connection of Agriculture and Chemistry, Lond.* 1795.

On this subject, Dr. MITCHELL observes, "if *carbonate of lime* [See CALCAREOUS EARTH] be thrown into a heap of manure, the fixed air will be expelled, and the septic acid take its place. Thus calcareous nitre is formed when quick-lime is employed as a manure upon land impregnated with putrifying matter, provided there is more lime than the septic acid can saturate; the surplusage may re-attract carbonic acid, if no stronger one prevent.

If mild lime be added instead of quick-lime, the septic acid will, as in the former case, constitute with it calcareous nitre; but will also cause an extrication of fixed air, which acts, when applied in a moderate quantity, both as a stimulant and nutritive ingredient in plants....*Med Repos.* Vol. I. p. 45.

Dr. DARWIN supposes that lime, and all calcareous earths, prove useful in vegetation: 1. by uniting with the carbon of the soil, or with that of vegetable or mineral recrements during some part of the

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* The manufacturers of marine salt, at Barnstaple, may profit by this hint....... *Editor.*

process of putrefaction; and thus rendering it soluble in water, and capable of being absorbed by vegetables.

2. A second mode, according to Dr. D. of lime serving the purposes of vegetation, is by its union with carbonic acid, and thus rendering it soluble in water, instead of being expanded into a gas; and thus a great quantity of carbon may be drank up by vegetable absorbent vessels.

3. Lime may promote vegetation by the phosphorus it contains; lime may be thus converted into an hepar, and in this way rendered soluble in water, without its becoming an acid by the addition of *oxygen*. Phosphorus is probably as necessary an ingredient in vegetable, as in animal bodies, which appears by the phosphoric light visible on rotten wood during some stages of putrefaction, which he supposes to be the phosphorus set at liberty from the calcareous earth, (in which it is known to abound) or from the fixed alkali, or the carbon of the decomposing wood, and acquires oxygen from the atmospere; and both warmth snd light are emitted during their union.

5. Lime may prove useful by destroying the cohesion of dead vegetable fibres, and thus reducing them to earth. This effect of lime must be particularly advantageous to newly inclosed commons when first broken up; [and hence the propriety of Anderson's directions, as stated in the article Land.] Lime, by being mixed with clays, it is believed, will make them less cohesive, and thus admit of their being more easily penetrated by vegetable fibres. It destroys worms, snails, and all other insects, with which it happens to come in contact, and with which almost every soil abounds.

This minute investigation into the theory of the action of lime, as a manure, was deemed necessary, on account of the variety of opinions entertained on the subject by agricultural writers, and by practical men. It is not for the Editor to decide, or to attempt to reconcile the opposite theories; and yet a *decision is necessary* by every practical man, before he attempts the use of this valuable manure; a random use of a substance which may prove useful or injurious, or perfectly inert, is very dangerous; for, in any of the above cases, a greater or less loss of money, and *certainly* of *time*, will be sustained. The farmer, therefore must make small experiments for himself, as a guide for future conduct in his more extensive cultivations: and, *let him be persuaded to keep minutes of these experiments*, and the *results*, and to *communicate them to the public*, as it is only in this way, that a decision upon the subject can be obtained, and the true mode of applying lime under various circumstances, be ascertained....For other remarks on lime, see articles Manure.

Peter Lossing, of Beckman town, Duchess county, New York, has obtained a patent from the United States for an improvement in the mode of burning lime, which promises to be of great utility. A kiln, containing 1500 bushels, may be completely burnt in forty-eight hours, whereas, in the old mode, at least double that time is required. The saving of wood is said to be in the proportion of one half. Persons, who wish to adopt the above mode of calcining lime-stone, are requested to apply

to Mr. Lossing, whose terms are moderate.

LIME-GRASS, or *Elymus*, L. a genus of plants comprising twelve species, three of which are natives of Britain: the principal of these is the *arenarius*, or Upright Sea Lime-grass, which grows on the sea coast, and flowers in the months of July and August....It is eaten by cows, horses, and goats, but refused by sheep; Dr. Withering questions whether it may not be advantageously formed into ropes, in the same manner as the Tough Feather-grass (*Stipa tenacissima*, L.), is manufactured in Spain. This plant is of essential service on the coast, for preventing the encroachment of the sea, in which respect it saves millions of florins to the Dutch, who cultivate it with great industry. Its mealy seeds and roots have, in times of scarcity, been converted into bread; and the grass itself, while young, affords proper food for cattle.

LIMES, the fruit of a variety of the Citron-tree (which see ;) growing abundantly in Jamacia, and other warm climates; it is the smallest production of the kind; has scarcely any pulp; but contains a very sour juice, of a yellow greenish colour. On account of its strong acid, it is by the West Indians generally used as an ingredient in punch, though it is frequently productive of the most alarming colics, especially the *dry belly-ache* of the cure of which we have already treated under the article Lead.

The inspissated juice of limes possesses a fine flavour; but, as it is one of the most corrosive acids, which is not suffered naturally to arrive at maturity, we cannot recommend it for its salubrity. Nevertheless the negroes in the West Indies employ this fruit with singular success for the cure of "scorbutic swellings of the legs, and stains of the skin, merely by rubbing the affected legs, knees, and hams, three or four times a day, with a fresh-cut lime." The same remedy is used in Jamacia, for mitigating those violent pains in the bones, which precede the disorder called the *yaws*.

LIME-TREE, [Linden-tree, Black poplar or Belstead,] or *Tilia*, L. a genus of trees consisting of seven species; the principal of which is the *Europæa*, Common Lime-tree, or Linden-tree, growing in woods and hedges; flowering in the month of July. In a rich soil, it attains a prodigious size, being sometimes twenty feet in circumference, but frequently hollow: there are instances of lime-trees having survived 800 years, in different parts of Germany.

The linden-tree is erroneously supposed to be a native of Britain; for, according to Mr, Pennant, it was imported into England previously to the year 1652. The blossoms of this tree are of a whitish colour, possess a fragrant smell and supply the bees with the best honey. Whether fresh or dry, they easily ferment, and Marggraf distilled from them a very fine flavoured brandy. The wood is soft, light, and smooth; close-grained, and not easily subject to be infested by the worm, if kept in dry places. It is used for making leather-cutters' boards, for carved work, and likewise for turnery-ware. The leaves may be dried, and preserved as winter fodder, being eagerly eaten by sheep and

goats. Cows also relish them in the autumn, but their milk thus acquires a very unpleasant taste. Excellent ropes are made of the inner bark on the Continent, and which do not soil the linen suspended on them for drying: from the same substance the Russisns manufacture mats, shoes, and other rustic garments. Linden cordage is so remarkably strong and elastic, that in this respect it is superior to iron chains.

The lime-tree is remarkable for the excrescences, or *galls*, which appear on the edges of its leaves during the spring: they are of an oblong irregular shape; of a reddish colour, and occasioned by a worm that inhabits them while alive, and which was first discovered by REAMUR. These animo-vegetable productions being very numerous, he was of opinion that they might be advantageously employed in dyeing: and, to ascertain their properties, he made various experiments, by rubbing the galls on linen, to which they imparted a beautiful red colour that was not discharged, though it had been washed two or three times... Hence, it is highly probable that *lime-galls* may be rendered valuable in the art of dyeing; and a considerable expense, which is at present incurred by the importation of cochineal, and similar drugs, might thus be saved.

This useful tree farther contains a mucilaginous juice, which, by repeated boiling and clarification, produces a substance similar to sugar: we conceive it may be extracted from it in the manner already stated under the article BIRCH-TREE.

The wood of the lime-tree, though affording an indifferent fuel, may be converted into excellent charcoal for drawing, and for the manufacture of gunpowder. From the external bark, RUGER prepared a fine rose-coloured lake. Both the bark and leaves afford materials for a coarse, but smooth, brown paper, of a reddish cast: and that manufactured of the former, is peculiarly well calculated for drawings. The seeds yield, on expression, a sweet and agreeable oil, similar to that which is found in ripe cocoa-nuts: and is of equal service as an ingredient in chocolate.

[The wood of this tree makes durable, but light timber. It will not bear much weight. The heart of the tree will last as long as oak in the ground. An infusion of the bark or flowers, in water, is a very useful remedy for sore eyes....... Good coarse paper has been made of the inner bark. The charcoal of this tree is highly esteemed in Europe in the manufactory of gunpowder. This fact may be of use to the inhabitants of the western parts of Pennsylvania, where the linden-tree abounds.]

LINE, for *angling*, a series of threads, or horse-hairs, twisted together, suspended on a rod, and furnished at the end with a hook for catching fish.

The best material for making lines, is horse-hair, which should be uniformly twisted, as its strength will thus be considerably increased. Silk is also occasionally employed: but it is by no means equal to hair. The best colours for lines are, sorel for turbid waters, and white, or grey, for clear streams. A light green tinge may be imparted to fishing-lines, by immersing the

hair in a liquor prepared of alum, soot, and walnut-leaves boiled together.

LINEN, a well known kind of cloth, made chiefly of HEMP and FLAX. Having already described the different processes which these substances undergo, before they are converted into cloth, we shall at present add only such facts as may tend to render our former statement more satisfactory. After the fil ments have been properly dressed and combed. See the article FLAX. The flax is spun into the yarn by the hand, in the usual manner: instead, however, of moistening the threads with spittle, or common water, we would recommend the mucilage prepared from the COMMON COMFREY (which see) to be preferably employed. By such simple means, the saliva, so useful in the process of digestion, may not only be saved, but the yarn will be totally divested of its brittleness, and, in other respects, considerably improved. Next, the yarn is conveyed to the loom, where it is woven into cloth (a process similar to that practised with wool, and described under the article CLOTH, vol. ii.); after which it is bleached, in the manner stated under that head in our first volume.

Linen is more difficult to be dyed of a *black colour*, than either wool or cotton. The black, imparted to it by means of green vitriol and galls, soon disappears by washing. It is, therefore, a desideratum of considerable importance, to procure such a preparation as will strike a beautiful, deep, and permanent black: for this purpose, we subjoin the following account, by Mr. VOGLER, of Weilburg. One quart of pure, soft water, is to be mixed in a large bottle, with two ounces, or two ounces and a half of common aquafortis; to which a similar quantity of litharge should be gradually added: the bottle, after being slightly corked, must be kept in a warm place, and occasionally shaken. In the course of a few days, the liquid may be poured into a deep earthen, leaden, or pewter vessel; when the linen intended to be dyed, should be well washed (though not bleached), and immersed in it for ten or twelve hours. It is then to be taken out, and, after being washed and rinsed three times in pure cold water, it ought to be dipped in a weak solution of common glue; again rinssed, and then placed in the shade to dry.

Three quarters of an ounce of galls, well bruised, are now to be boiled in a quart of rain, or other pure, soft water, for eight or ten minutes, when a similar quantity of common salt is to be added; and, as soon as the latter is dissolved, the linen should be boiled in the liquor for seven or eight minutes; then taken out, washed, wrung three times as before, and dried in the shade. By these operations, the stuff will imbibe a dark grey-yellowish tinge, that disposes it for the better reception of the colour.

Three quarters of an ounce of copperas, or vitriol of iron, and a similar quantity of common salt, are now to be dissolved in a quart of pure, hot water, and the linen immersed in the liquid for eight or ten hours; when it must again be washed, rinsed, and suspended for drying in the shade.

In order to strike the black colour, M. VOGLER next directs

three quarters of an ounce of logwood to be boiled for seven or eight minutes, in somewhat more than two quarts of rain or river water, when a quarter of an ounce of white starch should be added, having previously been mixed with a small quantity of fresh water, to prevent the rising of lumps. As soon as this is perfectly dissolved, the stuff ought to be boiled in the liquor for seven or eight minutes, after which it must undergo the same treatment as has been repeatedly specified.

The linen will thus acquire a fine black tinge; but, if the dye be not sufficiently deep, it may again be immersed in the decoction of logwood, and treated in the manner above stated, till the requisite shade be obtained. But as the stuff, in this state, will not admit of being washed in ley, or soap-water, without losing its colour, M. Vogler farther directs it to be dipped in a cold solution, prepared by boiling an ounce of galls, well bruised, for seven or eight minutes, in a quart of the glue-water, in which an ounce of copperas should then be dissolved. After the linen has remained one hour in this liquor, it must be pressed and dried in the shade: in consequence of these processes, it will acquire a beautiful and permanent black colour.

A durable, but expensive, *purple dye*, may be communicated to linen, by immersing it in a solution of gold, in aqua-regia. For this purpose, the latter ought to be fully saturated with the metal, and be diluted with a triple quantity of water: if a deep colour be required, the piece, when dry, must be repeatedly steeped in it; and as the tinge frequently does not appear for several days, the stuff should be exposed to the sun or free air, and be occasionally removed to a damp place or moistened with water.

Various patents have been granted for different processes relative to the bleaching, &c. of linen cloths. Several of these have already been noticed under the articles Bleaching, Cloth, &c. we shall, therefore, mention only a few others, to render our account more complete.

Among these are, 1. Mr. Tennant's, in 1799, for preparing the oxygenated muriates of calcareous earths, &c. in a dry form, and applying them to bleaching, &c. 2. Mr. Gillespie's, in the same year, for a new mode of printing linens, &c. 3. Mr. Foden's, in 1800, for a crystaline size, for dressing linen, &c. The reader will find an account of these in the later volumes of the *Repertory of Arts*, &c. where diffuse specifications are inserted.

As various frauds are often committed by unprincipled persons, who erase the marks or initials, made on linen with silk, we think it will be useful to communicate the following recipe, which was recommended by the late Dr. Smellie: He directs about half an ounce of vermillion, and two drams of the salt of steel, to be finely levigated with linseed-oil; the thickness or limpidity of which may be varied as occasion may require. This preparation for marking linen is stated to be equal, if not superior to the various compositions vended in the shops; and it perfectly resists the effects both of acids, and of alkaline leys.

Lastly, we cannot conclude this article, without recommending the strictest care to be taken in avoiding the use of *damp linen*, in any

form whatever; as we are convinced that many, by neglecting this simple precaution, have met with a premature dissolution. And if some regulations were made respecting inn-keepers, as far as relates to this subject, catarrhs, and various other diseases, would frequently be prevented.

LING. See HEATH.

LINIMENT, in Pharmacy, a composition, the consistence of which is of an intermediate nature, between unguents and oils: it is employed for anointing different parts of the body. The common preparations of this kind are:

1. The *simple liniment;* which consists of four parts of olive-oil, and one part of white wax: the whole is gradually incorporated, till it acquire a due consistence. It is chiefly used for softening the skin, and healing chaps; for which purpose, however, honey-water, in general, is more efficacious.

2. The *liniment of ammonia;* which is prepared by simply shaking equal proportions of the water of ammonia and olive-oil in a phial, till the whole is thoroughly mixed. This compound is of great service in inflammatory quinsies; for a piece of flannel, moistened with it, and applied to the throat every third or fourth hour, frequently carries off, or at least diminishes, the violence of the inflammation.

3. *Lime-water liniment;* which consists of equal parts of lime-water and linseed-oil, properly incorporated. It is very useful in scalds or burns, and if timely applied, effectually prevents the inflammation which generally takes place in such cases.

4. The *anodyne liniment*, or, *balsam;* is prepared by digesting one drachm of opium, and half an ounce of castile coap in four ounces of rectified spirit of wine, for the space of three days; then adding two drams of camphor, and half a dram of distilled oil of rosemary: the vessel should be agitated, that the various ingredients may be properly mixed. This composition is frequently employed with success, for mitigating the pains arising from sprained limbs, and similar local affections.

LINNET, or *Fringilla linota*, L. is a very elegant bird, of which there are several varieties: it is of a small size, and a greyish brown colour; the lower part of its breast is tinged with a fine blood-red spot, which disappears in the moulting season, and again becomes visible in the spring.

Linnets are deservedly esteemed for their song: the female constructs her nest in hedges and furze-bushes on heaths; deposits five whitish eggs, spotted similar to those of gold-finches; and breeds three or four times in the year.

With a view of teaching linnets to whistle tunes, or to imitate the notes of any other bird, they should be taken from the parent bird, when only between four and ten days old. If removed at this early age, they may without difficulty be taught to modulate their voice, and strike melodious notes, being remarkably docile birds. While young, they should be fed with equal parts of bread and rape-seed, bruised and boiled together, which may be given them several times a day, properly moistened; but this mixture must neither be suffered to become sour, nor dry nor stiff; as, in the former state, it will gripe and destroy them; in the latter, it renders them costive, and thus proves alike fatal.

Linnets are peculiarly fond of linseed, or the fruit of the flax-plant, which they divest of its husk or shell, before it is swallowed.... But it deserves to be remarked, that linseed, if allowed them unmixed with rape-seed, bread, canary seed, &c. is detrimental to their health, and, in a few weeks or months, proves destructive.

It has been attempted to teach linnets to pronounce words like parrots; and they have sometimes, though with considerable trouble, acquired the art of speaking in a manner more pleasing to children than adults.

LINSEED, or Lintseed, is the fruit of the flax-plant, or *Linum*, L. from the stalks of which, linen, cambric, and other sorts of cloth are manufactured.

According to the most experienced cultivators of flax, the excellence of the seed depends upon its weight, and the brightness of its colour. But, though such marks of distinguishing old from fresh, or heavy from light linseed, may be sufficiently accurate for the purpose of expressing the oil, yet they do not afford a satisfactory criterion, in selecting the most proper seed for the culture of this valuable plant. Hence, a handful of linseed should be thrown into a glass of water; and, if the whole or greater part of the grains in a few minutes sink to the bottom, such seed will be fit for sowing: or, by putting a small quantity of them in a silver spoon, and holding it over a moderate fire, all the grains that contain the germinating principle, will speedily escape. But the most certain method of determining their vegetating property is the following: Mix three parts of earth with one part of slaked lime; scatter a certain number of grains over this compost, moisten it with a little water, and attentively observe whether, in the course of 16 or 18 hours, all the grains have commenced to germinate. As lime uncommonly promotes the process of sprouting, it may be fairly concluded, that such of the seeds as evince no disposition to swell, within the time above stated, are unfit for being committed to the ground. See farther, Flax.

Linseed may be advantageously employed for the feeding of cattle, both when the oil is expressed, and also by boiling it into a jelly, as directed in article Cattle.

These seeds are esteemed for their emollient and anodyne virtues; they are used externally in cataplasms, to mitigate the pain of inflamed tumors. Internally, a weak infusion of them, by way of tea, is recommended in coughs, as an excellent pectoral, and as being very serviceable in pleurisies, nephritic complaints, and suppressions of urine. Linseed has likewise been employed in Asia, and, during times of scarcity, in Europe, as food; but it furnishes neither an agreeable nor wholesome aliment.

LINT, in surgery, signifies linen scraped so as to form a soft, woolly substances, which is employed in dressing wounds. It is made into various forms, denominated according to the shape of which they consist. Thus, if it be oval, it is called a *pledget*; and, if cylindrical, it is termed a *dossil*.

The purposes to which lint is applied, are, 1. To prevent the flow of blood in fresh wounds, by filling them with this absorbent substance; before a bandage can be applied; 2. To promote the healing of

wounds, especially when spread with some digestive ointment, or balsam; 3. For drying wounds and ulcers; 4. To keep them open, in order that the lips may not close before the interior part is perfectly healed; and lastly, to preserve wounds from the hurtful influence of the air. Trifling as lint may appear, it is an article of considerable utility, and with which every family should always be provided, to serve in case of sudden emergency.

LIPS, in anatomy, are the exterior edges or extremities of the mouth.

Lips are subject to few disorders deserving notice, excepting that called the *Hare-lip*, in which the upper part of the mouth is cleft, or slit, in a manner similar to that of a hare.

Chapped, or sore *lips*, may be healed by the frequent application of honey-water, and protecting them from the influence of cold air.

LIQUOR, a general name for any liquid preparation, but more particularly applied to such as are either fermented, or distilled: of the former class are, beer, ale, wine &c.; of the latter, are brandy, gin, rum, and other ardent spirits.

A patent was granted, in 1797, to Mr. JOSEPH BRAMAH, for his invention of certain new methods of retaining, clarifying, preserving, and drawing off every kind of liquor; and more particularly porter, ale, &c. together with various improved casks and implements, necessary for giving his contrivance full effect.

Our limits will not permit us to specify the different means employed by the ingenious patentee: we shall therefore, at present, only state the various objects effected by his contrivance.

1. To preserve all liquors, used as beverage, from flatness or acidity, while they are *on tap*, for any period of time; by which the expensive custom of bottling liquors may be entirely superseded.

2. To render water, and every other fluid perfectly pellucid, and to extricate it completely from all heterogenous matters, by means of a forced filtration, without the aid of isinglass, or any other chemical preparation, known under the name of *finings;* and which is usually employed for the purpose of clarification.

3. To convey every kind of liquor through small tubes from the cellar to any part of the house; by which means the cellar-door may be fastened at all times, and thus secured from the injurious access of either cold or heat; while intoxication, adulteration, embezzlement, &c. will be effectually prevented.

Lastly, to secure and draw off liquors, as occasion may require, by means of cocks constructed on a new principle, so that no person can open them, excepting such as have permission to that effect. Thus every person may ascertain, with accuracy, the quantity of beer, ale, &c. consumed. [Such a cock shall be described under article TAPPING.] To publicans, in particular, this invention must be a very great acquisition; as, beside the frauds committed on them by indolent or dishonest servants, considerable quantities of liquor will be saved, that are otherwise inevitably wasted by careless drawing, &c. The reader who wishes to obtain farther information res-

pecting Mr. Bramah's useful inventions, will find them described in the 9th volume of the *Repertory of Arts*, &c. where his patent is illustrated with engravings.

LIQUORICE, or *Glycyrrhiza*, L. a genus of exotic plants, comprising two species, the principal of which is the *glabra*, or Common Liquorice. Its long, thick, creeping roots strike several feet deep in the ground; the stalk often attains the height of five feet, and the red or blue flowers appear between the mucilaginous leaves, in the month of July.

This plant is propagated by cuttings of the fibres that issue from the parent root, near the surface of the earth: they should be divided into sets of six or eight inches in length, each having, at least, one good bud or eye, and planted in February, or in the beginning of March. A light, sandy, and very deep soil should be selected, well manured, and dug three spades deep. The sets ought to be put in the ground by means of a line and dibble, at the distance of 12 inches, in rows with their tops about an inch under the surface; and the rows should be a foot and a half distant from each other.

In three years after planting, the roots of the liquorice will be sufficiently large, and may be taken up between the months of November and February; for this operation should neither be commenced before the stalks are fully decayed, nor delayed till late in spring; in which latter case, the roots are apt to shrivel and diminish in weight. Hence, it is advisable to sell them almost immediately after they are removed from the field. They are vended to the druggists at from 20*s*. to 30*s*. or 40*s*. per cwt.; and an acre of good land produces 3000 roots and upwards; so that the produce has sometimes exceeded 60*l*.

The common liquorice is cultivated in most countries of Europe, for the sake of its sweet mucilaginous root: but that of British growth is preferable to the foreign, which is generally mouldy when it arrives; as this vegetable, unless preserved in a dry place, is remarkably liable to such corruption. In order to extract the juice, the Italians first cut the root in pieces then moisten and crush it in a mill; thus it is formed into a mass similar to dough, which is boiled for eight hours, and occasionally supplied with water. Next, it is twice pressed, so that all the mucilage may be completely separated: in this state it is slowly evaporated in another cauldron for twenty-four hours, or such time as is required to reduce it to a proper consistence. When cool, it is cut into cakes, either of a square or cylindrical form, and packed in chests with bay-leaves.

The powder of liquorice, usually sold, is often adulterated with flour, and probably also with articles less wholesome: the best sort is of a brownish-yellow, of a very rich sweet taste, and more grateful than that of the fresh root. As this vegetable is one of the few sweet substances tending to allay thirst, it was employed by Galen in dropsical cases, with a mistaken view to prevent the necessity of drinking. There is, however, no doubt of its gently detergent qualities, which render it an excellent medicine in coughs, hoarseness, asthma, &c.; for lubricating the throat, softening acrimonious humours, and affording relief to the organs

of respiration. But, with this intention, it ought to be taken as a diet-drink in considerable portions, by way of infusion; while the patient should abstain from tea, and other hot liquids, which only inundate the stamach, and aggravate the complaint.

In domestic economy, the sound roots of the liquorice may be employed as stopples for beer or wine-bottles, being more wholesome and durable than those made of cork.... BOHMER informs us, that sour ale or beer may be completely restored, by suspending in the cask a linen bag containing liquorice-powder, with a small portion of chalk and pot-ash. This assertion is strongly supported by the account of TOWNSEND; who, in the second vol. of his *Travels through Spain*, observes, that of the 200 tons wt. of liquorice, or *Spanish Juice*, annually produced in that kingdom, a considerable part is imported into London for the use of our porter-breweries.

LIQUORICE-VETCH. See MILK-VETCH.

[LIRIODENDRON, *tulipifera*, or Tulip bearing poplar, tulip-tree, American poplar, white wood. A native and well known tree, in the United States. It attains to a very large size, rising as high as any forest tree; and makes a beautiful appearance when in flower, about the middle of May. There are two varieties, the yellow and the white: both of which afford excellent timber. The yellow is soft and brittle; the white is hard, tough, and heavy. The bark of the root has long been employed by medical men, and others in the United States, as a *tonic;* and when joined with various proportions of black alder, (*prinos verticillatus*) and dogwood, (*cornus florida*) has afforded a remedy of equal efficacy with the Peruvian bark. It is a strong, bitter, and considerably aromatic; a decoction of it is said to be a common remedy in Virginia for botts in horses; the powder combined with steel-dust, is an excellent remedy in cases of general debility, or relaxation of the stomach. For a more particular account of the analysis and virtues of this medicine, the reader is referred to two papers in the *Amer. Museum*, vol. xii. by Drs. YOUNG and CLAYTON, to another by Dr. RUSH, in the *Transactions of the College of Physicians of Philadelphia*, and lastly, to one in a late volume of *Tilloch's Phil. Magazine*.]

LITERARY PROPERTY, is that right which an author justly claims in his original literary compositions; so that no person may, without his permission, either publish the work, or receive any profit from the printed copies.

The question relative to literary property has only within these few years been conclusively settled.... The late Dr. JOHNSON was of opinion, that the bookseller, or he who purchases the copy-right of a book, acquires the sole right of printing it, and of selling the copies printed in conformity to the manuscript: but, at the same time, such purchaser has no right either to make any additions to, or to expunge any part from, the work, without previously obtaining the author's permission, who still preserves an interest in the performance. The Doctor farther maintained, that abridgements were strictly legal, however the property of the purchaser, or the reputation of the

author, may be affected; because every work that comes into the possession of a reader, is liable to be examined, confuted, censured, translated and abridged.

The right of *abridging books* is, therefore, established both by reason and the customs of trade..... Independently of the copy-right naturally inherent by our common law, the statute 8 Ann, c. 19. declares the whole liberty of printing and re-printing a work, to be vested in an author, and his assigns, for the term of *fourteen years*, and no longer: such property is also protected by additional penalties and forfeitures. By the same statute it is farther enacted, that if an author be living at the expiration of that period, his original interest shall revert to him for a similar term of years.

LITHARGE, or *Lithargyrum*, a preparation of lead consisting of soft flakes of a yellowish or reddish colour. It is obtained by exposing calcined lead to a brisk fire, sufficiently strong to melt it into an oil; which, on cooling, concretes into a flaky matter. Thus, according to the different degrees of heat, it assumes a pale or deep red colour: the former is generally called *litharge of silver*; and the latter, *litharge of gold*.

This preparation is of extensive utility of roasting gold, silver, or copper ores, as it liquefies all earthy and extraneous matters into glass, and thus the metal is more easily separated. Litharge is also employed by potters, for glazing their wares (though such vessels are unwholesome, see vol. ii. p. 377;) and likewise in the composition of certain glasses; because it is not only fusible in itself, but contributes to the fusion of other substances. Lastly, it may be revived into lead: and thus considerable quantities, which are produced by refined metals, are again converted into their original form, by melting them upon burning coals.

Litharge plaster is prepared by boiling two parts of olive-oil with one part of litharge, over a moderate fire; adding water, and constantly stirring the mixture, till the two former are duly incorporated. This composition which was formerly called *Diachylon*, is usually applied in excoriations of the skin, slight wounds, &c. It's action is so far beneficial, as it keeps the injured part soft, and somewhat warm, while it excludes the external air; though such plaster ought to be employed with due caution.

LITHONTRIPTICS. See STONE.

LIVER, the largest and most ponderous of the abdominal viscera, which in adults, weighs about 3lb. It is situated under, and connected with the diaphragm, by means of the suspensory and other ligaments; extends over the right side of the stomach, and serves to purify the blood, by secreting the bile.

The liver of animals affords neither wholesome nor palatable food. The blood-vessels and biliary matters connected with this organ, render it still more objectionable, especially to plethoric persons. From its dry and earthy nature, it corrupts the chyle and obstructs the vessels: hence it requires a great quantity of drink, and ought to be eaten only by the robust, whose powers of digestion are unimpaired.

OBSTRUCTION OF THE LIVER, a disease in which the blood is apt to stagnate, and form congestions in that viscus. Its symptoms are, difficulty of breathing, an irregular

heat in the whole body, dry cough, loss of appetite, and a straightness about the region of the heart: the urine is at first thin and limpid; but, as the hectic fever increases, it assumes a deep orange-colour, and, at length, deposits a thick sediment. This complaint chiefly affects persons of sedentary occupations, or those whose natural discharges are suddenly obstructed, and such as use too gross a diet, or indulge in too long repose on feather beds.

Cure: Blisters applied to the region of the liver; emetics; mercury, used both externally and internally. Considerable benefit has also been derived from the use of gum ammoniac, in the form of an ointment, with oxymel of squills, and the application of emollient clysters; from the extract of the Common Hemlock, prescribed according to circumstances, [and last, but not least, from regular exercise on horse back.] The patient's diet should be light and nourishing.

Inflammation of the Liver, or *Hepatitis*, a most dangerous and frequent disorder in hot climates: it is accompanied with tension and pain in the right side, under the false ribs; a difficulty of breathing, and lying on the left side; dry cough, vomiting, hiccouth and loathing of food.

The more immediate causes of this affection are, indurations, or hard tumours of the liver; too great fatness in the *omentum* or caul; sudden exposure to cold air, or the drinking of cold water, when the body is over-heated; violent concussions, occasioned by too powerful emetics, &c.

In this, as in other inflammations of the viscera, recourse must be first had to blood-letting, which should be repeated according to the nature of the case; a blister is then to be applied to the part affected; mercurial purgatives, together with emollient and attenuating clysters, are next to be administered, [and a gentle salivation, raised either by the external or internal use of mercury.] The abdomen and legs ought also to be frequently bathed in warm water. Lately, the nitrous acid, largely diluted with water and mucilage, or syrup, has proved almost a specific in chronical affections of the liver, in the E. Indies; but this medicine cannot safely be taken, without medical advice.... The diet and regimen to be observed by such patients, we have already stated under the article Inflammatory Fever.

LIVERWORT, or *Lichen*, L. a genus of perennial plants, comprising 363 species, the greater number of which are natives of Britain; the most remarkable of these are:

1. The *calcareus* Calcareous, or Black-nobbed Dyers' Liverwort, which grows on lime-stone rocks in the North of England and Wales, and is in flower from July to December. This species is so peculiar to lime-stone rocks, that wherever these are found among other soils, they may immediately be distinguished by the appearance of this plant. When dried, pulverized, and steeped in urine, the calcareous liverwort is employed by the Welsh, and, by the inhabitants of the Orkney Islands, for dyeing a brilliant scarlet colour. It should be gathered in August completely dried, then reduced to powder, and steeped in urine for three weeks, in a close vessel.

2. The *parellus*, or Craw-fish-eye Lichen: it grows on rocks, walls,

stones, and on the trunks of trees; flowers from January to December. This vegetable abounds on the rocks in the North of England, where it is collected, and sent to London in casks. It imparts a red colour, and is used in making the blue pigment, known under the name of *litmus*.

3. The *tartareus*, or Large Yellow-saucered Dyers' Liverwort, which abounds in the Highlands of Scotland, and in the county of Derby: it incrusts most of the stones at Urswick-Mere, and is in flower from January to December. In Scotland, this species is gathered, cleaned, and, after being steeped in urine for the space of three months, it is formed into cakes; which, when dried, are pulverized, and employed for imparting to wool a fine scarlet colour, with the addition of alum. In England, it is collected and sold at the rate of one penny per pound, to dyers, for striking a purple dye.

4. The *omphalodes*, or Dark-coloured Dyers' Liverwort, Cork, Corker, or Arcell, which grows on rocks in several parts of Britain, and flowers the whole year. It is prepared in the same manner as the preceding species: with the addition of lime, and a little salt, it imparts a reddish-brown to woollen cloth; which, if it be afterwards dipped in the blue vat, will acquire a beautiful purple tinge. The dark-coloured liverwort is an useful *styptic*: it was formerly reputed in inflammatory fevers, cutaneous affections, and disorders of the liver; but is now justly exploded.

5. The *vulpinus*, or Gold-wiry Lichen, is found on the trunks of old trees, in various parts of Britain, and flowers during the whole year. It communicates a yellow colour to yarn; and, when mixed with pulverized glass, is strewed on carcasses in Norway, to destroy the wolves which infest that country.

6. The *prunastri*, or Common Ragged Hoary Liverwort, which grows on the trunks and branches of trees, and is in bloom from January to December. This species possesses the remarkable property of imbibing and retaining odours; on which account its leaves, when pulverized, form the basis of several perfumed powders: they also communicate a red colour to yarn.

7. The *caperatus*, or Wrinkled Liverwort, which abounds on the surface of rocks, stones, trees, and pales; it also flowers throughout the year. In Ireland, and the northern parts of the Isle of Man, it is employed for dying wool of an orange colour. If serge be previously infused, and boiled in urine, or steeped in a solution of green vitriol, and then dyed with this plant, it will assume a fine russet-brown tinge; but, if it be simply immersed in a decoction of the wrinkled liverwort, the stuff will acquire a lemon shade.

8. The *pustulatus*, or Spotted Liverwort, which is found on rocks in Wales, and the northern parts of Britain; it flowers during the whole year. According to LINNÆUS, a beautiful red colour may be prepared from this species; and Dr. WITHERING, states, that it may be converted into an excellent black pigment.

9. The *calicaris*, or Beaked Liverwort, grows sometimes upon trees, but more frequently on rocks, near the sea-coast. It is smooth, glossy, and whitish, producing flat or convex shields, very near the

summits of the segments, which are acute and rigid; and, being often reflected by the growth of the shields, appear under their limbs like a curved beak. This plant yields a fine red colour; and, in this respect, promises to become a substitute for the famous *Lichen Roccella*, (see ORCHAL,) which is imported from the Canary Islands, and sometimes sold at the price of 80*l*. per ton. Both the present and the preceding species *(Lichen pustulatus,)* were formerly employed instead of starch, in the manufacture of hair-powder.

10. The *aphthosus*, or Green Ground-Liverwort; it grows on moist rocks, in shady, stony, and moist places, and like most of the preceding species, it flowers from January to December. An infusion of this plant is made in milk, and given to the country people to children affected with the thrush. A decoction of it, in large doses, operates powerfully both as a purgative and as an emetic; it is said to be a good vermifuge.

11. The *Islandicus*, or Esculent Iceland Liverwort, abounds not only in the Highlands and Lowlands of Scotland, but is also found in some of the more northern parts of England and Wales. The inhabitants of Iceland boil this beneficial plant in several waters, then dry, and make it into bread. They likewise prepare from it a kind of gruel, which is mixed with milk; but the first decoction is never used; as it is strongly purgative. A jelly, or thick mucilage, made of the Iceland Liverwort, is recommended by HELLER and SCOPOLI, as an excellent domestic remedy in consumptions. In Germany, a very durable brown dye is obtained by first boiling linen yarn, for one hour, in a solution of alum and cream of tartar; then adding to this liquor the dried Iceland Liverworth, and suffering it to boil for half an hour at the least, when the yarn is again to be immersed for a quarter of an hour or longer, stirring it properly, and afterwards plunging it in a weak, cold solution of copperas or vitriol of iron. But the Iceland Lichen also imparts a very excellent black to white woollen yarn, by previously boiling it for one hour in a liquor made of the dried plant, and an equal quantity of copperas, in pure water; then removing it from this brown dye, and again boiling it for fifteen minutes in a strong decoction of log-wood: thus the wool assumes a deep black colour, which presents no other shade.

12. The *pulmonarius*, Lung-wort-Liverwort, Hazel Rag, or Hazel Crottles, which abounds on the trunks of old trees, especially those of oaks. and on heaps of stones, in moist shady situations. It has an astringent, bitter taste; and is used in Siberia as a substitute for hops, though it renders the ale narcotic, and occasions the head-ach. This plant was formerly much esteemed in consumptive cases. According to Dr. RUTTY, woollen cloth dyed with the lungwort, acquires a durable orange colour.

13. The *caninus*, or Ash-coloured Ground Liverwort, which grows upon the ground among moss, at the roots of trees in shady woods; and is frequently found on heaths, stony places, and in hedges: it is in flower throughout the year.... This species has acquired its celebrity by Dr. MEAD's assertion, that it is an infallible preventive of the consequences arising from the bite of a mad-dog. *It is, how-*

ever to be regretted, that this medicine has but seldom [*nay*, NEVER,] *proved effectual.* [See vol. 1. p. 287.]

14. The *cocciferus*, or Scarlet-bearing Liverwort, which is common on heaths, and flowers from October to April. This species assumes various appearances, according to its age, situation, and other circumstances affecting its growth. It may, however, be easily distinguished by the fungous tubercles, which are of a beautiful scarlet tinge, and grow on the top of its stalk. These excrescences, when steeped in a solution of pot-ash, are said to impart a fine and durable purple.

15. The *plicatus*, Officinal Stringy Liverwort, or Tree-moss, which grows on the branches of trees in thick woods, and is in flower from January to December. ....It was formerly used as an astringent to prevent hæmorrhages, and to cure ruptures. LINNÆUS observes, that the Laplanders successfully apply the tree-moss to their feet, with a view to relieve the excoriations occasioned by too great exercise. Professor KALMS remarks, that if this vegetable be collected from fir or birch-trees, it communicates a green colour to wool, previously boiled in alum-water.

16. The *barbatus*, *v. articulatus*, or Bearded Liverwort, thrives in woods, and on the branches of trees; flowering throughout the year. It grows from half a foot to two feet in length, is of a whitish-green cast, and possesses considerable astringency. When steeped for some time in water, the whole plant acquires a red-orange colour, which is employed by the inhabitants of Pennsylvania to impart that tinge to various stuffs.

17. The *Roccella*. See ORCHAL.

It is remarkable, that the *lichens*, or mushrooms, cannot be propagated by seed; and that, with these fungous productions, there appears to commence a new and intermediate kingdom, partaking both of vegetable and animal nature: so that the generation of fungi seems to be involved in a process of fermentation, which suddenly assumes a vegetable form.

All the indigenous species of the lichens contain a considerable portion of viscid matter; which has by the Earl of DUNDONALD, been successfully converted into a gum, possessing all the properties of the SENEGA, at present used by calico-printers. These vegetables abound chiefly on trees, growing in poor stiff soils: they attain to maturity in three or four years: so that a crop may be taken from the same tree, every fourth year.

The liverwort is furnished with an external skin, beneath which is found a green resinous substance: the remainder is composed partly of gum, and partly of an animal fibrous matter, that is insoluble both by heat and the action of alkalies. In order to extract the gum from such plants, they are first scalded two or three times in boiling water; in consequence of which the rind or skin is separated, together with the greater part of the resinous ingredient. The vegetables, thus prepared, are next put into copper vessels and boiled, in the proportion of 1 lb. to 2 gallons of water, for four or five hours; half or three quarters of an ounce of soda or pearl-ashes, or half a

pint of volatile alkali, being added to every pound. The boiling is continued till the liquor acquires a gummy consistence; when it is strained through a hair sieve, and the residuum is expressed through hair-cloth bags, by means of presses similar to those used by tallow-melters.

The extract thus obtained, is then suffered to stand for 10 or 12 hours; after which it is strained, and evaporated in lead or tin vessels, placed over stoves moderately heated by fuel, or by the steam of hot water, till it be of a proper consistence for block printing. If such gum, however, be intended for making ink, manufacturing paper, or staining and stiffening silks, crapes, gauze, &c. Lord DUNDONALD observes (in his circular letter addressed to the calico printers of Scotland), that no *alkaline salts* must be employed for extracting the liverwort; and the boiling be continued for a longer time, and with a moderate degree of heat: thus, the gummy extract will become nearly colourless; but, if volatile alkali be used, it will be necessary to substitute *iron* vessels for those made of copper.

Lord D's gum has been found to answer every purpose for which it was designed: as its preparation is not only cheaper, and will produce a considerable saving of money annually sent to Senegal, but will also afford employment to numerous women, children and others, in collecting, as well as in preparing, the lichens; it promises to be a national benefit.

LIXIVIUM, or LEY, signifies a solution of salts or ashes in water, for the different purposes of bleaching, washing, dyeing, &c. Having, in the progress of this work, frequently employed the term *lixivium*, we shall in this place only observe, that a ley may be made either of the vegetable or mineral alkali; that the latter is often found native in some parts of the earth, as well as universally combined with the waters of the ocean; but that the former is uniformly obtained from the ashes of burnt vegetables. Hence a lixivium may be prepared even from straw reduced to ashes, if more substantial plants cannot be procured on the spur of the occasion.

LIZARD, or *Lacerta*, a genus of amphibious animals, consisting of several species; the most remarkable of which is the *Agilis*, or common green Lizard, a native of Britain. It is extremely nimble; of a green colour; and though perfectly harmless, its form inspires general disgust. During the heat of summer, this animal delights to bask on the sides of dry banks, or beneath aged trees; but, as soon as it is noticed, it immediately retreats to its hole. The food of lizards consists of insects, and they are themselves devoured by birds of prey. But, notwithstanding their terrific appearance, these animals are of real service, especially in gardens; and ought by no means to be destroyed, merely to gratify an unnatural and cruel aversion.

LOADING OF GOODS, the act of removing ponderous substances, such as timber, corn, or other merchandize, to a cart or waggon.

[Mr. GEO. DAVIS, of Windsor Co. Berks, England, has invented a portable machine for loading and unloading goods, for which the *London Society of Arts*, conferred on him forty guineas, in the year 1797. A plate and description of

the machine, may be found in the transactions of the society for the above year.]

Loadstone. See Magnet.

LOAM, in agriculture, any species of earth, less cohesive than clay but more compact than chalk.

There are several varieties of *loam*; the most common of which we shall enumerate.

1. The *clayey*, that is likewise called *strong*, *stiff*, *cold* and *heavy* loam: it consists of a mixture of clay and coarse sand; is distinguished by the name of *Windsor loam*, and is much used for making bricks, building furnaces, &c.

2. The *chalky* loam; the constituent parts of which are chalk, clay, and coarse sand.

3. The *sandy* loam, consisting of the same ingredients as the preceding kind, though the sand prevails in a larger proportion. The two latter varieties are frequently blended, and compose what is called a *deep crumbly* loam. This was formerly supposed to be unfit for vegetation, till it had been exposed for several years to the influence of the sun, air, frost, &c. Experience, however, has evinced the contrary; and it is certain, that though the vegetative powers of this *barren earth* (as some have disdainfully called it) remain latent for a longer time than in soils which have undergone a proper degree of fermentation; yet, after its surface is broken up and properly stirred, it will, at the expiration of *one* year, be well adapted to the production of crops.

A deep crumbly loam is particularly calculated for the growth of fruit-trees; and, if it be laid in ridges during one winter, and the succeeding summer, it will afford ample nourishment to such trees; even though it should have been turned up from the depth of 6 feet in the ground.

Lob-grass. See Brome-grass, the Soft.

LOBSTER, or *Cancer*, L. a genus of insects comprising 20 species; the principal of which is the *grammarus*, or Common Lobster; it has a smooth breast, four pair of legs, six joints in the tail, and rounded train-fins.

These creatures inhabit the clearest water, at the foot of rocks that impend over the sea. They are brought in vast quantities from the Orkney isles, and several parts of the eastern coast of Scotland, to the London markets. Being extremely prolific, they begin to breed in the spring, and continue to spawn during the greater part of the summer. Dr. Baster counted 12,444 eggs under the tail of one lobster, beside those which remained in the body unprotruded: after being deposited in the sand, these embryons are soon hatched.

Lobsters change their shell annually, and acquire a new one in a few days: like crabs, they will renew their claws if deprived of them by accident. These shell-fish are remarkably voracious, feeding on sea-weeds, garbage, and all sorts of carcass.

Few lobsters are taken by the hand; as the greater number are caught in *pots*, or a kind of trap constructed of twigs, baited with garbage, and formed similar to a wire mouse-trap, so that the insect, after entering it, cannot escape. Such machines are fastened to a cord sunk in the sea, and the place is marked by a buoy. In Summer, they are found near the shore, and thence to about six fathoms deep;

but, in winter, they are seldom taken in less than twelve or fifteen fathoms of water.

Lobsters continue to grow in size only while their shells are soft. Those selected for the table ought to be heavy in proportion to their size, and be furnished with a hard crust on their sides, which, when in perfection, will not yield to moderate pressure. Barnacles, and other small fish, adhering to them, are considered as certain signs of superior quality. The male lobsters are, in general, preferable in the winter, and may be distinguished from the female, by their narrow trains, and a strong spine upon the centre of each transverse prominence beneath the tail.

The meat of a lobster's claw is more delicate and easy of digestion than that from any other part; yet there have been instances where the eating of this shell-fish has been productive of disagreeable effects, especially when it is consumed in a state approaching to putridity. Thus, the greater number of lobsters sold in London are boiled and re-boiled, every day, for a week, or longer, to sweeten them *externally*, though the inner part is generally corrupted. Such a dish cannot fail to be extremely unwholesome; and we advise those who have inadvertently partaken of it, and are in consequence affected with putrid eructations, to drink large portions of strong lemonade, or a mixture of vinegar and water; because vegetable *acids* are in this case the most efficacious *antidotes*. Sometimes, the immoderate use of lobsters is attended with eruptions of the erysipelatus kind in the face, or a species of nettle-rash over the whole body; either of which, being salutary efforts of nature to expel noxious matter, are more troublesome than dangerous.

LOCK, a well-known contrivance for fastening doors, chests, or the like; and which is generally opened with a key.

From the different structure of locks, adapted to various purposes, they acquire different names...... Those fixed on outer doors, are called *stop-locks*; those on chamber-doors, *spring-locks*; and such as are affixed to trunks, are known by the name of *padlocks*, *trunk-locks*, &c....Of these, the spring-lock is the principal, both on account of its more general utility, and for the curious intricacy of its structure. Its chief constituent parts are, the main-plate; cover-plate; and pin-hole: to the first belong the key-hole, top-hook, cross-wards, bolt-toe, or bolt-knap, draw-back spring-tumbler, pin of the tumbler, and staples....With the cover-plate are connected a pin, main-ward, cross-ward, and step-ward or dap-ward: lastly, the pin-holes corresponds with the hook-ward, main-cross-ward, shank, pot or beard, bow-ward and bit.

The excellence of locks consists in the security they afford: and as numberless schemes are continually brought forward by designing men, to elude every contrivance of the most ingenious mechanics, the invention of a durable lock, so constructed as to render it impossible for any person to open it, without proper keys, has ever been an object of considerable importance.

In the year 1784, the *Society for the Encouragement of Arts*, &c. conferred their silver medal on Mr. TAYLOR, of Petworth, for his improvement on the latch or spring-bolts of common locks.....

This is effected by simply reversing the tumbler, so that its curved side acts against two stubs fixed on the tail of the latch, and thrusts back the latter with ease; whether the knob be turned to the right or to the left, when the lock is opened. Mr. Taylor has also, behind the tail of the latch, fixed a guide containing a groove, in which runs a small *friction wheel*, that serves to keep the latch in its direct situation, and at the same time to diminish its friction: the arms of this tumbler are somewhat contracted, in order that the latch or spring-bolt may move with greater facility. By this construction, the parts of the tumbler and latch, which are in contact, move in a line, so that they pass over the greatest space, under the smallest angle; and the lock itself may be constantly used for several years, without requiring the application of oil.

The same society also granted, in the same year, the sum of ten guineas to Mr. Marshal, for a *secret escutcheon*, which when fixed to a lock, may be so repeatedly varied, that even the artist who made it, is unable to open the lock: as, however, a satisfactory description of its mechanism cannot be given, without the aid of engravings, we refer the reader to the 3d vol. of the Society's *Transactions*.

In June, 1801, a patent was granted to Mr. Holemberg, for his invention of locks or fastenings adapted for general use, on a new and improved construction. The external form of the locks, thus manufactured, corresponds with those in common use: internally, however, an orbicular bolt is substituted for a rectilineal one, the security of which is increased by an inside tumbler that is fastened by a flag spring-bolt. The whole manufacture of this lock is remarkable for its simplicity and ingenuity, with which it combines the important advantage of *security*; so that this contrivance justly merits the preference.

Various patents have been obtained for the construction of locks, so as to prevent the possibility of picking them: The principal of these is M. Bramah's, registered in 1784; and Mr. Spears's in 1795; but, as the account of those would be unintelligible without the aid of several engravings, the curious reader will consult the 5th and 8th vols. of the *Repertory of Arts and Manufactures*, where they are minutely specified.

Lock, in *inland navigation*, denotes all such works (whether of wood or stone) which are intended to raise the water of a river; but it is more particularly applied to a kind of canal inclosed between two gates, the upper of which is called a *sluice-gate*, and the lower a *flood-gate*. These serve to confine the water, and thus to facilitate the passage of boats, both in ascending and descending the canal.

In the year 1791, a patent was granted to Mr. James Playfair, architect, for his method of constructing the locks of navigable canals on a new principle, and also for improving such as are already erected. With this design a certain portion of water, in the ascent and descent of vessels, is conducted into reservoirs or cisterns communicating with the lock upon different levels, and thus eventually saved; because their apertures may be opened and closed at pleasure, so that only the sixth part is

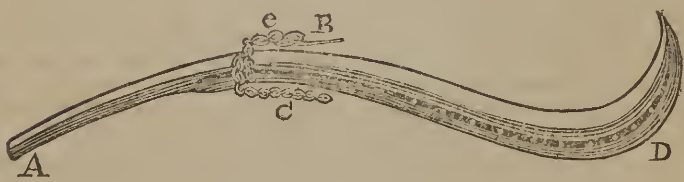
required for the passage of boats. The particulars of this ingenious contrivance are inserted, and illustrated with engravings, in the 3d vol. of the *Repertory of Arts and Manufactures*.

Another patent was granted, in 1798, to Mr. JAMES FUSSELL, for his invention of a machine or balance-lock, serving to raise or lower boats on canals; an account of which appeared in the 11th vol. of the work before quoted.

LOCKED JAW. See JAW.

LOCKING - POLE, an ingenious piece of mechanism, to be affixed to the wheels of waggons or other carriages, when descending steep-hills.

As many distressing accidents happen from carts over-powering the shaft-horse, when proceeding down declivities, Mr. THOMAS COLLEY laid before the Society for the *Encouragement of Arts*, &c. a contrivance for preventing such casualties: in consequence of which, he was rewarded with their silver medal. The following cut represents this useful invention:



A, The hollow, which lies on the nave of the wheel.

B C, The chains that clip the felly of the wheel.

D, The front part of the pole, shod with iron; and which is farther strengthened by a rib of iron, that is rivetted along its side, as is indicated by the black line, in the cut.

In order to apply this locking-pole, the chain C is put round the felly of the wheel; the pin B is passed through the last link of C, and turned back through the movable ring *e*: thus the wheel is secured, and any waggon, however laden, may descend the steepest hill with safety.

To prevent the locking-pole from breaking, Mr. COLLEY directs it to be made of the stem of an ash-tree, the *spurns*, that is, the beginning of the roots of which, have not been cut off in felling. He farther remarks, that if a horse, which has been accustomed to such situation and to descents, be put in the shafts, the animal will be so much inclined to hold back, that it will be extremely difficult to make him draw. This exertion, however, is absolutely necessary; as otherwise the chain-horse which should always be linked to the locked side, will be obliged to pull an unnecessary weight, occasioned by his being considerably lower than the points of the shafts.

Lastly, in conveying the locking-

pole from one declivity to another, it is to be placed between the lower part of the cart and the axle-tree, while the smaller end is to be buckled with a strap fixed under the body of the cart, on the driving side.

LOCUST, or *Gryllus Locusta*, L. a family of insects, natives of Asia and Africa, where chiefly two species are remarkable, namely:

1. The *Shielded Locust*, so called from the pectinal shield covering its breast. It is marked with a greenish hue, but a deeper yellow beneath its body, and the inside of the hind-legs is red: it attains the size of a robust man's finger, and is eaten in the East; an instance of which occurs in Scripture, where it is recorded that St. John used this insect as his food.

2. The *Migrating Locust*, which is of a smaller size, has a greyish-blue head, yellowish and brown spotted wings above, green ones below; and a reddish belly behind. It's peculiar native soil is Great Tartary, whence these insects have sometimes migrated into Europe, (flying at the rate of twenty-five English miles in a day), and committed extensive devastations in corn-fields. They multiply more speedily than any animal in the creation, but are formidable only in the countries where they breed; being unable to live in cold climates. In the year 1748, a flight of these depredators was seen in Britain, but they fortunately occasioned no damage. If, however, at any future period, they should again invade this island, it will be advisable to burn, previously to their approach, such combustibles as emit a thick and offensive smoke; for instance, turf, wet straw, &c. sprinkled with sulphur. An instance occurred many years since, in Germany, where a swarm of locusts was driven from one district to another, by the noise of bells, spades, hammers, and other metallic instruments.

LOGIC, is the art of thinking and reasoning with judgment and propriety: or, it may be defined to be the history of the human mind, because it traces the progress of knowledge from the first and most simple conceptions, through all their various combinations, gradations, and the inferences that are drawn from a comparison of ideas.

Logic, is doubtless, one of the most important sciences that can be impressed on the young mind; inasmuch as it unfolds the nature of the faculty of reflection, while it displays the proper manner in which the mental powers are to be exercised, in the pursuit of truth and knowledge. Farther, it cautions us against those errors and mistakes to which we are liable in consequence of inattention; while it teaches us to discriminate between *real* and apparent truth; being thus admirably calculated for the investigation of interesting subjects, both of literature and morality; as it enables parties to detect the fallacy of Argument. We could with pleasure point out other essential advantages, resulting from the art of thinking; and, though a reference has been made from our first volume to this article, for a farther investigation of error in arguments, yet, as such discussion would lead us into too wide a field of speculation, we refer the reader to the following excellent works, in which the first principles of reasoning are clearly developed, and the juvenile mind is taught to distinguish between truth and falsehood.......1. "*Elements of Logic*,"

by Prof. DUNCAN, of Aberdeen, 8vo.; 2. Dr. TATHAM'S "*Chart and Scale of Truth, by which to find the Cause of Error*," &c. 2 vols. 8vo.; and 3. Mr. COLLARD'S "*Essentials of Logic*," &c. 12mo. 2d edit. pp. 223, 1796.

LOG-WOOD, *Hæmatoxylum Campechianum*, L. an exotic plant, which grows wild in the bay of Campeachy, Honduras, and other parts of the Spanish West-Indies, where it rises from 16 to 24 feet in height. In the beginning of the 18th century, it was introduced into Jamaica, where it is employed as a fence against cattle. If the lower branches be pruned away, while the tree is young, it will grow to a considerable size; and, when old, its wood will be of equal value to that imported from Honduras. The trees are cut into billets, the bark and white sap of which are chipped off, while the red part, or *heart* only, is selected for sale.

Logwood is used in great quantities for dyeing purple, green, blue, and especially for *black* colours; according to the different ingredients employed. The last mentioned dyes, however, are not *durable*, unless previously tinged *brown*, in a decoction of the dried Iceland Liverwort; which serves as the basis of fixing the colouring matter..... Indeed there are many indigenous plants that may be advantageously substituted for logwood, and other dyeing drugs: a general survey of which, the reader will find in our *General Index of Reference*, to be given at the conclusion of the present work. Hence we shall only add, on the authority of PORNER, that in all the experiments made with logwood, he found alum, without adding any cream of tartar, to produce a better effect than in a state of combination with this acid; and, for fixing or rendering the different colours more durable, blue vitriol was uniformly the most successful ingredient.

Independently of its utility as a dyeing drug, logwood has lately been found to possess considerable astringency as a medicine: hence a decoction, as well as an extract from it, has been given with advantage, in cases of diarrhœa.

LONGEVITY has ever been a desirable object among the rational part of mankind; though the licentious epicure appears to measure the duration of his life by the *good things* he has enjoyed, rather than by the number of years he has lived.

Longevity depends on a variety of circumstances, which, since the introduction of manifold luxuries, rarely unite in the same person: the principal of these is an *hereditary disposition*, which might be more regularly transmitted to children, if the frequent abuse of solid and liquid aliment, especially the custom of giving them fermented and spirituous liquors, together with the indulgence in the fashionable enervating passions, were not alike conspicuous in the present state of society, among youth and adults.

Other requisites to longevity are, a perfect birth or formation of the infant, supported by proper and rational treatment; a gradual cultivation of the mind; a constitution uncontaminated by hereditary disease; and a tranquillity that is not easily disturbed by external objects. Where these conditions prevail, and strict temperance is observed, there is a prospect of attaining to a

mature old age :....from the contrary causes, or conduct of individuals, the alarming increase of deaths in large towns, may be easily explained, and especially if it be contrasted with the more simple, though gross, habits of a country-life. See LIFE and DEATH.

LOOKING-GLASS, a plain glass mirror; which being rendered impervious to light, exhibits the images of such objects as are placed before it, apparently at the same distance behind.

Looking-glasses are made of plate-glass, which is cast and ground in the manner described under the article GLASS. When the plates are polished, a fine blotting paper is spread on the table, and strewed over with levigated chalk, which is covered with a thin leaf of tin-foil. Upon the latter is poured the purest quicksilver, that ought to be distributed uniformly over the leaf, with cotton or other soft substance : over the mercury, clean paper must be placed ; and upon this, at length, the glass-plate is pressed down by the right hand, while the paper is gently removed with the left. The plate is now covered with thicker paper, or cloth, and a heavy weight laid on it, so that the superfluous quicksilver may be expressed, and the tin adhere closely to the glass : when it is sufficiently dry, the weights are taken off, and the work is complete.

Looking-glasses are equally ornamental and useful in domestic life : hence they should not be exposed to accidents, or placed against damp walls, or in other moist situations, where the quick silver loses its tenacity, and the beauty of the glass will, in a short time, be impaired. Those idle or conceited persons, who waste every day a *certain* portion of time, by examining their dress and countenance before a looking-glass, ought to bestow an equal share of attention on their moral scrutiny: thus, we trust, they will easily discover how to make a more proper and economical use of their leasure hours, which are literally *killed* before a mirror, that exhibits only the *surface* of things.

LOOM, a machine, by means of which several distinct threads are combined into one piece, or contexture.

Looms are of various forms, according to the different materials to be woven ; and the various methods of weaving. As our limits do not permit us to detail them, and as they would be unintelligible, without the aid of engravings, we shall briefly mention Mr. SAMUEL SHOLL'S improved *Silk Loom*, for which the *Society for the Encouragement of Arts*, &c. in 1790, conferred upon him a silver medal. His ingenious contrivance is peculiarly calculated for the lighter branches of silk-weaving : by its construction, it admits more light to the workmen and may be placed in almost any low garret, without breaking the walls; the *porry* may be made of any length, by only screwing the cane-roll posts nearer or farther from the breast-roll ; and it is, on the whole, more portable, and fixed with less trouble, than any loom hitherto invented... Another advantage is its cheapness; the price being one third-less than that of the common looms ; beside which, the most valuable parts of the old materials may be still preserved, and adapted to the new machinery. For a more minute account of Mr. S's contri-

vance, the reader will consult the 8th volume of the *Transactions* of the patriotic Society above-mentioned.

LOOSE-STRIFE, the Creeping, or *Lysimachia nummularia* L. an indigenous, perennial plant, growing in moist shady meadows; and flowering in the months of June and July. This vegetable affords a wholesome food for cattle and especially for sheep. On account of it's sub-acid and mildly astringent properties, it is considered as one of the most efficacious vulnerary herbs. Bechstein asserts, that the leaves and flowers of this plant, steeped in oil, furnish an excellent remedy for destroying the worms, and insects infesting the floors of granaries.

LOOSE-STRIFE, the Hyssop-leaved, or *Lythrum hyssopifolium*, L. an indigenous annual plant, which grows in stagnant waters, and marshy grounds: in the month of August, it produces bright purple flowers from which a very beautiful pigment may be extracted, in the manner pointed out vol. ii. under the head of Colouring-matter.

LOOSE-STRIFE, the Purple or Purple-spiked Willow-herb, Grass-Poly, *Lythrum Salicaria*, L. an indigenous perennial plant, growing in marshes, and on the banks of rivers; flowering in the months of June and July. This neglected vegetable is remarkable, as every part of it acquires a red colour, when it begins to decay... Morand observes, in the *Memoirs of the French Academy*, for 1769, that he found roots and branches of the purple loose-strife buried under ground, between the rind of which were deposited several particles of a beautiful blue colour; and that, by chemical analysis, they proved to be a true *native Prussian blue*. Suckow obtained from the flowering stalks, on the addition of green vitriol, a deep black dye; and Dambourney, on preparing the cloth in a diluted solution of bismuth, a very fine chesnut tinge... In tanning, likewise, the whole plant, while in blossom, has been employed with advantage; so that according to Gleditsch, excellent sheep-skins were fully dressed, in the course of twelve days.

Lotion. See Washing; and Cosmetics.

LOTTERY, a kind of public game at hazard, which, in this country is managed by commissioners appointed by parliament... It consists of a certain number of tickets, that are drawn out of two different wheels, one of which contains a limited proportion of blanks and prizes; and the other, the corresponding tickets.

Lotteries were originally instituted with a view to raise money for the service of the State; but this method appears to have been contrived by persons, who possessed no practical knowledge of mankind as it encourages a spirit of gambling, that cannot be too severely censured. One of the most cogent arguments to discourage this practice, appears to be the disproportion between the distant gain, and the probable loss of the numerous adventurers: nay, it is an indisputable fact, that if a *club* of infatuated persons (indeed, there are too many of this description) were to purchase the tickets of the whole lottery, they would necessarily lose about *fifty per cent*, of their money; and in a similar situation is the single share-holder, who besides,

incurs the risk of losing the whole.

It is to be regretted, that the consequences of this evil are not confined to the more opulent clas of society; but extend even to those industrious members, whose utmost exertions are frequently inadequate to furnish their families with *bread*. Yet such is their infatuation, that nearly the whole of their weekly earnings is squandered on *insurances:* and it is a melancholy proof of the folly of mankind, that of the bread usually consumed, *one-third* only is eaten during the eventful period of drawing the lottery. Hence we think it our duty to state abuses of such magnitude; as they prey on the vitals of the community: and we trust that the wisdom of the legislature will shortly be induced to reform, or, if possible, to abolish the whole department of the lottery, and to adopt a less hazardous, and more dignified plan of finance.

LOVAGE, or *Ligusticum*, L. a genus of plants, consisting of thirteen species, two of which are natives of Britain. The principal of these, is the *Scoticum*, Scottish Lovage, or Sea-parsley, growing on rocks and cliffs near the sea-coast in Scotland, and the Western-Islands: flowering in the month of July. It is relished by horses, sheep, and goats, but refused by cows. This species is greatly valued in the Isle of Sky, where it is eaten either as salad, or boiled as greens: its roots are reputed to be excellent carminatives, and an infusion of the leaves affords a good physic for calves.

LOVE, generally speaking, denotes all those pleasing sensations which are excited by certain objects, or incidents. It however, more frequently expresses that affection which consists of personal desire, esteem, and benevolence; which forms a bond of attachment, and cements the union of individuals of different sexes; so that each feels, in the society of the other, a kind of happiness which no other object can impart.

The effects of this passion, on the efforts and disposition of man, are often surprising: it operates in a manner equally beneficial on the body, and has sometimes remedied the most inveterate complaints, which had defeated the skill of physicians, and resisted the powers of medicine.

Though the most impetuous of all the passions, its progress is generally slow; and if due precautions were taken, it would seldom be attended with unfavourable consequences. Reason, however, often fails to subdue the first attacks of love, so that it ceases to excite pleasure, and not unfrequently reduces its victim to the lowest state of despondency. Hence it is advisable to remove every object, that tends to kindle the passion; and to introduce the patient into cheerful society. With the same intention, the strictest temperance should be observed; the mind and body alternately employed, by study or exercise; while the diet ought to be low, and less nourishing than usual. But the most efficacious remedy in the plurality of instances, would be the union of the two parties; and, if parents were more solicitous to consult the *real* inclination and interest of their children, we are persuaded, that not only the number of wretched couples might be considerably diminished, but the

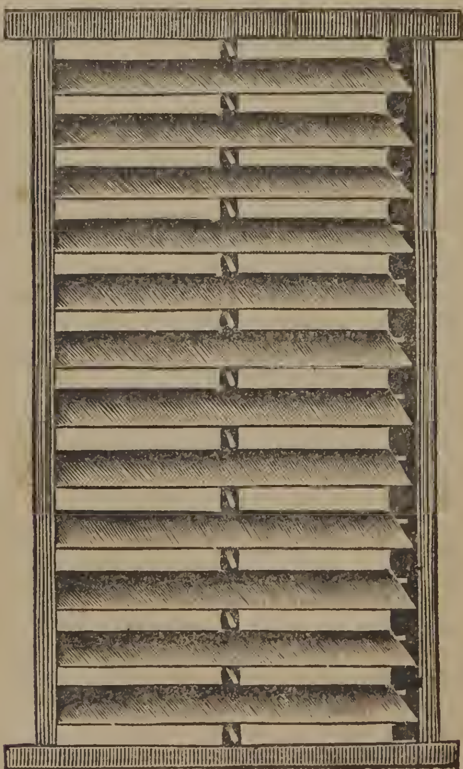
public streets of populous cities would not be infested with those hapless females, who are at present doomed to perdition.....they afford, indeed, too many incontestible proofs of the imperfect state of society.

LOVE-APPLE, or *Solanum Lycopersicum*, L. a native of the East and West Indies, whence it has been introduced into our gardens.

The love-apple is greatly esteemed at table: it is either used in soups or broths, to which it imparts an agreeable taste; or it is boiled and served up as a *garnish* to dishes of animal food.

[The cultivation of this excellent vegetable is rapidly extending in Pennsylvania, where a few years ago, it was scarcely known. The apples stewed make an excellent sauce for fish; and a fine catsup, which is used by the French in a variety of dishes.

LOUFFER, an upright post having a number of projecting pieces of wood, of small diameter, for the purpose of lifting the slats of windows, of work-shops, barns, and stables. The number of projecting pieces are proportioned to the number of slats; the post is placed on the top and lower part of the window frame, and turns upon pivots above and below. The



slats likewise turn on their centre; and when it is required to lift them, a person takes hold of the handle which is fixed about the centre of the post and turns it round, the projecting pieces then pass under the slats and elevate them. The annexed cut will give a good idea of this contrivance, which, though common in curriers' shops, and breweries, is introduced with a view of recommending them to farmers for barns and granaries.]

LOUSE, in zoology, a genus of insects too well known to require any description.

Lice are not peculiar to mankind, but infest quadrupeds, birds, fishes, and vegetables. Each class of animals is troubled with a particular species of those vermin; and birds are remarkably obnoxious to their attacks. There are forty different species of lice that prey on the fluids of living animal bodies, and which are distinguished by their colour, shape, and size; nay, even insects, such as snails, spiders, and bees, are not exempt from them.

The human race is liable to be exclusively invaded by three different species of lice, namely, 1. The Crab, or Body-louse, which never appears in clothes, or on the head, but harbours only in some parts of the bodies of uncleanly, or such persons as are disordered by dissipation: it is easily exterminated, by applying a strong decoction of tobacco, or mercurial ointment. 2. The Clothes-louse is larger than the next species, and has a thick head; it visits the skin only for imbibing the necessary portion of its nourishment, when it retreats to the folds and seams of clothes: these vermin may be speedily destroyed by fumigating the articles of dress with sulphureous vapours. 3. The Head-louse frequents only that part of the body, and is so prolific, that each female, in the course of twelve days, deposits several hundred eggs, or *nits*, which are closely cemented to the hair, and hatched in six or seven days, by warmth and perspiration: after 3 weeks, the young brood is fit for propagating their species; and as there are, perhaps, a hundred females to one male insect, their rapid increase may be easily conceived.... Want of cleanliness; immoderate warmth; violent perspiration; and a corrupted state of the human fluids, remarkably promote their generation. Among the most simple and harmless remedies for extirpating these vermin, is the seed of parsley reduced to a fine powder. But, if the humours of the whole animal body are in so vitiated a state, that the blood is contaminated by sensual excess of every kind, there arises the *morbus pedicularis*, or the most dreadful of all diseases, in which those disgusting insects are bred in ulcers, and cover the whole frame, so that the ill-fated victim cannot be relieved.

Some constitutions, however, are more exposed to these odious vermin than others; and it is remarkable, that sea-faring men, performing voyages to the East-Indies, though infested with them on leaving Europe, lose them in a certain degree of latitude during their voyage; but, on their return, are again liable to their incursions.

Beside the remedies already suggested, we shall only observe, that in cases where danger is apprehended from lice, it will be useful to take nourishing, succulent food, and to use wholesome

drink. As a cure for the pedicular disease, MERCURIALIS advises frequent purgatives; at the same time, to anoint the parts affected with garlic and mustard; to make use of salted and acid food; to bathe, and to foment the body with a decoction of gall-nuts; but the most effectual remedies are, sulphur and tobacco, mercurial ointment, black pepper and vinegar.

LOUSE-BERRY. See SPINDLE-TREE.

LOUSE-WORT, or *Pedicularis*, L. a genus of native perennial plants, comprising two species, viz.

1. The *palustris*, or MARSH LOUSE-WORT, which grows in marshes, ditches, on moist meadows, and in pastures; where it flowers in the months of June and July. This vegetable is eaten by goats, though not relished by hogs; and refused by horses, sheep, and cows; in the latter of which, if accidentally swallowed among other grasses, it occasions bloody urine. Hence this dangerous and troublesome weed ought to be diligently eradicated.

2. The *sylvatica*, COMMON or PASTURE LOUSE-WORT, thrives on wet pastures, and heaths; it flowers in June and July. This plant is refused both by cows and swine: it is particularly noxious to sheep; which, if fed with it, will, in a short time be covered with scabs and scurf; their wool will become loose, and be over-run with vermin: the expressed juice, or a decoction of this herb, has been advantageously applied, by way of injection, to sinuous ulcers.

LOZENGE, a form of various medicines moulded into small, flat cakes, to be held or chewed in the mouth, till they are dissolved.

As lozenges are of considerable utility for various purposes, we shall give a few instructions for preparing them, together with some simple recipes. First, particular care ought to be taken that no decayed or impure matter be admitted into the powder; the dry aromatics should be moistened with a little water during the pulverization; and those which possess a greater degree of humidity, ought to be gradually dried in a gentle heat, before they are committed to the mortar. If the mass prove so viscid as to adhere to the fingers in mixing the ingredients, the hands may be rubbed with any sweet oil; or some pulverized liquorice, starch, or flour, may be sprinkled over them during the process. As soon as the lozenges are formed, they must be placed on an inverted sieve, in a shady but airy situation, where they should be frequently turned, in order that they may be perfectly dried; and, when all moisture is exhaled, they should be preserved in glass, or in well-glazed earthen vessels, secure from the influence of damp air.

Liquorice Lozenges: Let four ounces of the extract of liquorice, (Spanish juice); a similar quantity of gum-arabic, and eight ounces of double-refined sugar, be dissolved in warm water, and strained; after which the ingredients are to be evaporated to a proper consistence. This preparation is an agreeable pectoral, and may be used at pleasure: it is well calculated to allay that tickling sensation in the throat, which excites coughing.

White pectoral Lozenges. Consist of one pound of double-refined sugar; four ounces of gum-arabic,

and one ounce of starch: these ingredients should be finely pulverized, and formed into a mass of a due consistence for lozenges, which in their effects are similar to those of the preceding composition.

Liquorice Lozenges with Opium: ....Take two drams of pure opium, and half an ounce of tincture of Tolu: let the opium be ground with the tincture till it be perfectly dissolved, when eight ounces of common syrup, and five ounces of extract of liquorice previously softened in warm water, are to be gradually added. While these ingredients are triturating, five ounces of pulverized gum arabic are, by degrees, to be sprinkled in the mixture; and, as soon as the whole is incorporated, it may be formed into lozenges, each of which should weigh ten grains....These are very serviceable for troublesome coughs that depend on an irritation of the fauces, which they remarkably tend to relieve; but should not be used too freely, as the large proportion of opium they contain, cannot fail to render the body costive.

Lozenges of Magnesia....Let four ounces of magnesia, two ounces of double-refined sugar, and one scruple of pulverized ginger, be incorporated with the mucilage of gum arabic, and worked into a proper form. This preparation is eminently useful to those who are troubled with the heart-burn; especially if that complaint depend on acidity generated in the stomach.

LUCERN, or *Medicago sativa*, L. a valuable exotic plant, which sometimes grows naturally in meadows, pastures, and on ditch-banks; flowers in the months of June and July......It was introduced from France into Britain, about the middle of the seventeenth century.

Lucern thrives best in deep, rich, friable loams, whether they abound in sand or gravel; as well as in all good dry soils, and in the coldest climate. As the luxuriance of its crops depends entirely on keeping the soil clear from weeds, this circumstance ought to be particularly attended to, while the plant is young. The land ought, therefore, to be previously cleaned; for which purpose Mr. YOUNG recommends two successive crops of turnips or of carrots, as the most successful mode of preparing it; but, if a fallow be found more convenient, a man should follow the ploughs or harrows while working; collect all roots, weeds, &c. and clear away such as have taken too deep root, to be eradicated by those implements. The soil must be ploughed and harrowed three times in the second spring, previously to the sowing, in order that it may be perfectly pulverized. There is no absolute necessity for manure; though, when laid on, it should be spread with the first crop of carrots or turnips.

The land being thus prepared, lucern may be propagated either by sowing it broad-cast; by drilling; or by transplanting it; all of which methods have been attended with such success, as to render it difficult to decide which is the most advantageous. The proper season for sowing, is towards the end of March, or in the month of April: if broad-cast, 20 lbs. of seed will be required for one acre; if drilled, 6 lbs. will suffice, provided the seed be set in equi-distant rows of two feet; and, if the lucern be sown with corn, the value of the crop will be considerably in-

creased. The best grain for this purpose, in Mr. Young's opinion, is *oats;* six pecks of which should be sown on an acre of very rich land; but, if the soil be indifferent, two bushels are requisite; and, if it be *poor*, three bushels are to be allowed to each acre. As soon as the oats are sown and harrowed, the lucern should be deposited in the ground, and a light harrow passed over; a similar method ought to be adopted if the seed be drilled; but, if sown in a nursery, with a view to transplantation, it should not be mixed with any corn, but committed to the ground early in the spring; after which the young plants ought to be carefully *hand-hoed*, to facilitate their growth till the month of August, when they will have attained sufficient size to be removed to the field.... This operation is performed by taking up the plants with a sharp spade, during moist weather; then cutting off the tap-roots, eight, nine, or ten inches beneath the crown of the plant; though the lateral fibres must be somewhat shortened, and the stalks clipped off about five inches above the crown. After these operations by the knife, the plants are to be thrown into a vessel of water, and placed in the shade, that they may retain their freshness. Holes are next to be made with a dibble, and filled with water, in which the roots are set at the distance of 40 inches from each other, the stalks being earthed up to the height of two inches. Should a dry season succeed, it will be requisite to water the plants liberally; as they will thus not only be invigorated, but the soil will be settled around their roots. The intermediate spaces ought to be carefully cleared from weeds after every cutting: and when the plant arrives at perfection, it will admit of being mowed five and even six times in one season.

Lucern is of great value, and fully merits the commendations bestowed upon its culture. On rich and well-tilled soils, its growth is so rapid, that it rises to the height of *eighteen* inches within *thirty* or *forty* days; and its produce on poor land is fully adequate to maintain three horses per acre: though, if the ground be well managed, it will readily support from three to six horses. The expense of raising this plant is very considerable: Mr. Harte, in his *Essays on Husbandry*, (8vo. 5*s*. 6*d*. 2d edit.) estimates it, when transplanted, at 6*l*. 12*s*. per acre for the first year; and the cost of the second, as well as each subsequent year, during the continuance of the plant (which may be fixed upon an average at ten years,) will amount to about 2*l*. per acre.

The first use of this beneficial plant is that of *soiling* horses in the stable: for this purpose it is peculiarly advantageous; few other articles of food agreeing so well with those animals. It is likewise eminently adapted to the soiling of working oxen, cows, young cattle, and even hogs in a farm-yard. In short, Mr. Young conceives lucern to be well calculated for fattening oxen, though it has never been tried with such design. Farther, as hogs do not bite so closely as sheep, he supposes that the former might eat it with safety, and that a small field, planted with it, near the farm yard, "would be of admirable use and profit."

Beside these various purposes to which lucern is subservient, it ame-

liorates the soil so that considerable crops of corn have been obtained after it; nay, instances have occurred, in which a complete ploughing, that was given with a view to eradicate it for corn, has renovated this plant, to such a degree, that it was left again for another series of years. Those of our agricultural readers, who wish to acquire more minute information relative to the management of lucern, will consult Mr. HARTE's classical work above mentioned, and also Mr. ROCQUE's *Practical Treatise on cultivating Lucern Grass* (8vo. 1s. 6.) in which this interesting subject is fully discussed, while its advantages and expenses are fairly appreciated.

[Under the article grass, some observations were given upon the culture of lucern, in this country, which being the result of experience, deserve attention. A friend informs the editor, that he tried it many years since, near Charleston S. C. in drills, and that it succeeded admirably. The long continued heat enabled him to cut it five times in one season. Dr. MUHLENBERG of Lancaster cultivates it, and "sows it alone, after potatoes or Indian corn, or in preference after cabbage crops, about the 2d of May; he cuts and feeds it green," and speaks highly of it.

Lucern certainly is well calculated for the hot summers of the United States; its long tap root seeking nourishment from a great depth, enables it to withstand the destructive droughts, which so frequently occur. The Editor saw it in July last, near Philadelphia, in a field with clover, green and fresh while the clover was nearly destroyed, no rain having fallen for some weeks.

The seed should be fresh, and if sent for to France, (whence the British seedsmen obtain it) care should be taken to procure that of the last season.]

LUMBAGO. See RHEUMATISM.

LUNACY. See MADNESS.

LUNGS, in anatomy, denote the two viscera or lobes in the cavity of the breast by which we breathe. They are connected with the neck, and situated on the right and left side of the heart. Being furnished with innumerable cells, which are formed by the descent of the wind-pipe into the lungs, those bronchial tubes communicate with each other; and the whole appears not unlike a honey-comb.

The most important use of the lungs is that of *respiration*, by which the circulation of the blood is supposed to be effected; and by the consequent alternate pressure of the different parts of the lower belly, the digestion of food is promoted. Besides, not only the expulsion of the feces and urine greatly depends on the constant action of the lungs, but likewise the sense of smelling is enjoyed by inhaling the air; and it is chiefly by the organic structure of these vessels, that mankind are enabled to speak. Lastly, they perform the office of excretion, and expel those useless matters, which if retained in the system, would be productive of fatal consequences.

The organs of breathing are subject to various affections, such as ASTHMA, CATARRH, COUGH, &c. which are discussed in their alphabetical series. Hence, we shall at present treat only of the *Peripneumonia*, or INFLAMMATION OF THE LUNGS. This dangerous affection manifests itself by a moist cough, in which the expectorated matter

is frequently streaked with blood; by an obtuse, dull pain under the breast-bone, or between the shoulders; anxiety and difficulty of breathing; the face is swelled, and appears of a purplish hue. It chiefly attacks persons of gross habits, who eat strong food, and drink viscid liquors: it is generally fatal to the asthmatic, especially if they be of an advanced age.

Causes. An inflammation of the lungs is not always a primary disorder, but more frequently is the consequence of a quinsey, pleurisy, catarrh, and other diseases. It also arises from an obstructed perspiration produced by cold; from the wearing of wet clothes; from too violent exercise; fractures or other injuries of the ribs; suppression of the itch, rose, and other cutaneous eruptions; as well as from the exhalation of noxious or sulphureous particles; and lastly, from worms.

The peripneumony is divided into the *spurious*, which is occasioned by pituitous or viscid matter obstructing the lungs; and the *catarrhal*, which may orginate from any of the causes already specified, but more especially from a defluxion of thin acrid matter on these organs. The treatment of both, however, being similar, we shall briefly state the chief points relative to this subject.

Without exception the most efficacious remedy in pulmonary inflammation is blood-letting, which may be performed in either arm; and the quantity of blood to be taken away must be in proportion to the patient's strength... Leeches may also be advantageously applied; and, if a large portion of blood is to be drawn, it will be safer to have recourse to cupping and scarification, as nearly as possible to the part affected. Next to bleeding, the antiphlogistic or cooling regimen should be strictly adhered to; the patient not be indulged in feather-beds, or warm couches, so long as he can support himself; and warm diluent drinks, impregnated with vegetable and nitrous acids, should be given in copious draughts.

Poultices and fomentations have also been applied to the painful side with considerable success; but the repeated use of blisters has been found more effectual. Much, however, depends on an easy expectoration, for which purpose linseed-oil, or other mucilaginous demulcents, are eminently serviceable... De Haen recommends the use of oil mixed with opium; Dr. Hamilton found the latter drug, when combined with calomel, to be very beneficial in this and other inflammatory diseases; and his experience of this medicine has been amply confirmed.

Among the various remedies proposed with the view to affording relief in the commencement of this formidable disease, few have been more efficacious than the steam of warm water impregnated with vinegar, and copiously inhaled by means of Dr. Mudge's machine, of which we have already given some account, in our 1st volume. (See Inhaler)...One of the most powerful expectorants, however, appears to be the tartarized antimony, given in very small or nauseating doses. And, as inflammations of this nature frequently terminate in what are called *critical* and spontaneous sweats, these ought to be cautiously promoted, but without the aid of stimulant medicines...Lastly, the diet cannot

be too slender; it should, indeed consist chiefly of weak broths, slightly acidulated with the juice of oranges or of lemons; and the patient's drink ought to be thin water-gruel, sweetened with honey, or a decoction of liquorice, the roots of fennel, and the like, in which a small portion of currant or similar jelly, may be dissolved.

INFLAMMATION OF THE LUNGS, in *Farriery*, a disorder to which horses are occasionally subject. It is indicated by the animal's restlessness, as he never lies down during the prevalence of this malady: his fever is violent, and he breaths with difficulty. The mouth is generally open, whence a kind of ropy slime flows copiously, while a viscid reddish or yellowish water runs from his nose, and likewise adheres to the inside of his nostrils.

The first remedy in this complaint is bleeding: three English quarts of blood should be taken from the animal, on the first day; and four pints, on the succeeding morning. If the unfavourable symptoms do not abate, it will be necessary to draw blood repeatedly, one quart at a time; but, if the creature be old and weak, the bleedings ought to be sparing in quantity, and more frequently repeated. Next, some sweet hay and bran should be cut very small, scalded together, and placed in the manger, in order that the fumes may be inhaled. Mr. TAPLIN directs this *internal fomentation* to be attended to every fourth or fifth hour, and the following decoction to be immediately administered.... Let six ounces of pearl-barley, a similar quantity of split raisins and Turkey figs cut in slices, and two ounces of bruised stick liquorice, be boiled in a gallon of water, till the liquid be reduced to three quarts. It is then to be strained, and a pound of honey added, while it is hot; and, as soon as it is cold, a pint of distilled vinegar. Of this decoction he prescribes one pint to be given, with the addition of an ounce of nitre, every fourth, fifth, or sixth hour, according to the greater or less urgency of the symptoms.

Should the disease progressively become more obstinate, and the animal be costive, a clyster ought to be given; consisting of two quarts of common gruel, six ounces of coarse sugar, four ounces of Glauber's salt, two ounces of tincture of jalap, and a quarter of a pint of olive-oil. The injection is to be repeated once in twenty-four hours, or oftener, if necessary. But, if the virulence of the disorder abate in consequence of these appplications, the subsequent treatment may be similar to that stated in p. 256 of our second volume: beside which, one of the following balls may be administered every morning, for a fortnight:....Take Castile soap, six ounces; gum ammoniac, two ounces; anise seeds and cummin seeds, of each four ounces, in powder. These ingredients are to be incorporated with a sufficient quantity of honey to form a mass, which should be divided into twelve balls. The horse's diet, during the progress of the disease, ought to consist of warm mashes of scalded bran, sweetened with four ounces of honey; while his common drink may be thin gruel, in each draught of which two ounces of cream of tartar should be dissolved. These preparations, however, may be gradually relinquished, as the animal recovers; and the mode of treatment

be varied as circumstances may require.

LUNGWORT, or *Pulmonaria*, L. a genus of perennial plants, comprising six species; three of which are natives of Britain: the principal of these is the *officinalis*, Common Lungwort, spotted Lungwort, Cowslips of Jerusalem, or Broad-leaved Lungwort; growing in woods, and flowering in the months of April and May. This species is eaten by sheep and goats, but is not relished by cows, and totally refused by horses and hogs. It is cultivated in gardens, on account of its leaves, which, in a fresh state, possess a slightly astringent and mucilaginous taste. They are recommended in tickling coughs, pulmonary consumption, &c. but are more useful as a culinary vegetable, and as salad, especially in early spring.

When burnt, the common lungwort affords a larger proportion of ashes than almost any other plant; the produce, in general, amounting to one-seventh part of its weight.

LUPINE, or *Lupinus*, L. a genus of exotic plants comprising nine species, most of which are cultivated in gardens, on account of their beautiful flowers: they are raised from seed, which may be sown in any open borders, where they thrive, and present a pleasing variety.

The seeds of the WHITE-LUPINE (*Lupinus albus*) have a leguminous, though disagreeably bitter taste, and are said to be vermifuge; both when taken internally, and applied externally. Some authors, however, suppose them to be of a poisonous nature; yet such seeds were much used by the Greeks as an article of food, and have been recommended by GALEN as affording wholesome aliment. In the *Transactions of the Patriotic Society of Milan* (vol. ii. p. 243, Ital. edit.) there is an account of the manner in which this plant may be converted into *cordage* or ropes, and likewise into *paper*.....BECHSTEIN says, that its flowers furnish the bees with abundance of honey.

LUTE, a composition of certain viscid or tenacious matters, which becomes solid, when dry; and which, on being applied to the junctures of vessels, closes them so effectually as to prevent the admission or egress of air.

Though lute is chiefly used by chemists, it also comprehends any species of cement, applied to vessels, or furnaces, which are exposed to an ardent heat. It is variously prepared of rye-flour and water; quick-lime and the whites of eggs; iron-filings, brick-dust, and linseed oil; potters earth, river-sand, horse-dung, pulverized glass, or flocks of wool mixed with salt-water or bullocks blood. The best lute, however, and which is most easily procured in London, is *Windsor-loam*: it should be moderately stiff, so that, when moistened with water, it may be pressed into the side, or crevices of the furnace, &c. As soon as the clay begins to dry, it must be beaten closely down to the sides, and the fissures repeatedly filled up, till the whole be perfectly closed.

The late Dr. BLACK recommended a simple mixture of sand and clay, as preferable to any other composition. The proportions for resisting the violence of fire are, four parts of sand to one of clay; but, if the lute be intended for lining or coating furnaces, he directs six parts of sand to be taken to one

of clay in order that the contraction of the latter may be effectually prevented. This compound is to be applied in a manner similar to that above stated, but it must be allowed to dry for a considerable time; after which a fire may be kindled, and the furnace gradually heated for one or two days. The heat should then be raised to the highest degree of intensity, by which the lutting will acquire the hardness of free-stone, and afterwards be as durable as any other part of the furnace. [See CEMENT.]

LUXATION, signifies the dislocation of any bone out of its natural articulation, so as to impede or destroy its proper motion. The general symptoms of this complaint are, inability to move the injured limb; pain; tension; and deformity of the part affected: it is also frequently attended with inflammation and fever.

In the treatment of simple luxations, if the contiguous skin and muscles be much inflamed, leeches ought first to be applied, and the dislocated limb kept in the most easy posture, before the reduction of the bone can be attempted; because the stretching of a limb, while the surrounding muscles are in a state of inflammation, may prove highly injurious: the upper part should likewise be held steady, while the surgeon is replacing the bone. And, as the contractile power of the muscles frequently resists every mechanical effort, they ought to be previously relaxed by emollient poultices or fomentations, in consequence of which the bone may be easily replaced.

After the operation, the limb must be kept in a relaxed state, and the bone supported with a bandage, till the parts have recovered their proper energy; but where any visible inflammation remains, it will again be requisite to apply leeches.

If dislocation be accompanied with a fracture near the joint, such injury must be allowed to heal previously to reducing the bone.... Where, however, any tumour or collection of matter near the joint is the cause of *luxation*, this affection may be considered as incurable; but, if it proceed from too great relaxation of the ligaments, or tendons of the joint, the complaint has frequently, though gradually, been removed by supporting the limb with a proper bandage; by the use of the cold bath, and by electricity.......During the whole period, between the setting, and healing of a luxated bone, the patient must preserve the disordered part in a state of rest; subsist on mild but nutritious aliment; and carefully avoid the influence of the depressing passions.

LUXURY denotes voluptuousness, or an extravagant indulgence in whatever pleases the senses, such as the articles of food, dress, and equipage.

The utility or detriment of luxury to a State, is a subject on which great difference of opinion prevails among political writers. Nor is it easily decided, whether this predominant feature in mankind may with more propriety be called the offspring of vice or folly; but luxury doubtless increases in proportion to the influx of trade; and, though it may by prescription be justifiable at court, in public officers, or on particular occasions, yet in private individuals it will ever remain an object of just reproach. For, by increasing the expenses of a family, it presents an insuperable bar to

matrimonial establishments, and thus contributes to the depopulation of a country. Farther, it impairs the health and ruins the constitution of its votaries; and as the opulent leave their rural seats, in order to reside in cities, such change is attended with many bad consequences to themselves, as well as to their numerous domestics. Thus, the country is in a manner deserted; and thence we may account for the long train of evils arising from the indolence and libertinism of a city-life.

One of the most pernicious consequences resulting from the rapid progress of luxury, is the *high price of provisions*, which is, in a great measure, occasioned by the keeping of useless servants, as well as of unnecessary horses: these partly consume, and partly waste such a portion of food as might be more beneficially employed in the support of the industrious poor. Lastly, though luxury be the attendant on wealth; though it encourage arts, manufactures, agriculture, and commerce; and, when its prevalence does not corrupt the morals of a people, becomes a national benefit, by diffusing riches among all ranks, and enabling the poor to pay the most exorbitant prices of provisions; yet we presume to say, that the greatest benefit would result from the observance of *sumptuary laws*, which should limit the expenses of individuals from exceeding a certain point; because that money, which is at present spent in the purchase of articles not strictly necessary to domestic life, might thus be diverted into its proper channel, and be more generally circulated throughout the country.

END OF VOLUME THIRD.

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